Pit and Quarry
With which is consolidated CEMENT-MILL & QUARRY
Member Audit Bureau of Circulations
Read in Largest Number of Plants
Vol. XXIII CHICAGO, JANUARY 27, 1932 No. 9

Offer Joint Cement Bid for Hoover Dam

FOUR PRODUCERS ASK $1.28

The combined bid of four Southern California cement companies has been indicated as the low for the supply of cement to be used in construction of Hoover dam.

The Riverside Cement Co., the California Portland Cement Co., the Southwestern Portland Cement Co., and the Monolith Portland Cement Co., combining for the bid on the giant engineering project, offered to supply cement in bulk at $1.28 a barrel, f. o. b. at point of shipment. As of government request, the combined companies bid $1.78 a barrel for 5,000 barrels, or $8,900 for cement in sacks. The bidding on bulk cement was for 375,000 barrels, and at the rate of $1.28. This amounted to $480,000. The bid for loose cement delivered was $2.22 a barrel, or $832,500.

If the bid is accepted the cement will be shipped from Crestmore, Colton, Victorville and Monolith, Cal., at the rate of 3,500 barrels daily, and a monthly shipment of 105,000 barrels is guaranteed.

Cancel Wichita's Annual Road Shows and School

The annual Southwest road show and school and the Western tractor and power farm equipment show for 1932 scheduled to be held February 23-26 at Wichita, Kans., has been called off on account of general conditions.

This does not mean that the show has been entirely abandoned. It will be carried on in 1933 the same as usual, probably the last in February, according to an announcement by the organization.

Cement Plant Increases Shipments of Limestone

Shipments of limestone from the Yosemite Portland Cement Co. quarry at Emory, Cal., on the Merced river, have been increased from a few cars every other day to 15 cars daily over the Yosemite Valley Railroad line to Merced, it was declared by George A. Fisher, general manager. An increase in personnel, both at the quarry and the cement plant at Merced, is the result, Mr. Fisher said. The increased shipments are being made, he said, to build up reserves for an anticipated improved market this summer.

$2,500,000 Potash Plant to be Erected in Texas

The Texas Potash Co. of Dallas plans construction of a potash-refining plant and mine unit at its potash beds near Odessa, Tex., to cost $2,500,000. The company owns 12,000 acres of land, underlaid with potash at workable depth. It has been making test-hole explorations of the property for some time past. The main shaft will be 2,100 ft. deep. Mining operations will be started during the present year, officials of the company have declared.

Fire Destroys Plant of Sand Co. Near Wilbur, O.

Fire destroyed the Lancaster Coal & Sand Co. plant at Wilbur, O., near New Lexington, early Sunday morning, January 10, at a loss of $140,000.

For the past two months the plant had been idle. When the blaze was discovered by Superintendent T. E. Hummel, who lives nearby, it had gained such headway that fire fighters were helpless. The loss was partially covered by insurance.

Canadian Gypsum Plans New Nova Scotia Plant

Construction of a modern plant to manufacture products of gypsum mined near Windsor, Nova Scotia, will be started in a few weeks if weather conditions permit according to officials of the Canadian Gypsum Co., a subsidiary of the United States Gypsum Co. of Chicago.

Cement Workers Receive Christmas Bonus Checks

Depression or no depression, every employee of the Great Lakes Portland Cement Co. at Buffalo, N. Y., enjoyed the annual Christmas party staged by the company and received a bonus check, the amount of which depended upon the worker's length of service with the company.

The Great Lakes plant will operate throughout the winter, Adam L. Beck, president, declared at the gathering and no reduction of the working force of 200 men is contemplated, he said.

Higher Output Seen by Universal Atlas

UPTURN MAY COME BY FEB. 1

The Universal-Atlas Cement Co. plants at Buffington, Ind., largest producing units in the world, report prospects of increased employment and production about Feb. 1.

Officials of the company, a subsidiary of the United States Steel Corp., admitted added production and employment would be possible, barring unforeseen difficulties, when the rehabilitation and improvement program now underway will be finished. This work will be completed late this month.

The company is finishing an improvement program involving the expenditure of $1,750,000 on the largest of its three Buffington units. The program includes installation of dust collectors, new boilers and other improvements.

The largest mill now is operating at approximately 33 1/3 per cent. capacity, while the prospective upturn would send the figure to about 66 2/3 per cent. it is reported.

Approximately 900 men are employed in the largest mill and in construction work, with possibilities of an increase in this employment figure, shortly. When operating at near capacity, the combined units employ about 2,000 men.

Dust Nuisance at Lime Plant Halts Operations

Because a local court recently held its operations to be a nuisance on account of the volume of dust they created, the Chubbuck Lime Co. of San Francisco has closed its plant, pending the installation of dust-arresting equipment, according to J. H. Davidson, superintendent.

Ohio Stone Man Dies in Hospital at Age of 62

Michael J. Mullen, 62, superintendent of the Sterling Grinding Wheel Co., of Tiffin, O., a branch of the Cleveland Stone Co., died at a hospital at McConnelsville, O., recently of a lung infection. He had been ill since last June. He came to Ohio from Chester, Mass., 32 years ago.

December Building Shows 17% Decline

TOTAL FOR MONTH $55,279,157

Building permits in 577 cities and towns of the United States during the month of December, 1931, amounted to $55,279,157 according to official reports made to S. W. Straus & Co. This figure represents a 17.2 per cent. decline from November of this year, when the volume for these cities was $66,721,631, as compared with a normal seasonal expected increase of 6.5 per cent. Permits issued during December, 1931, fell 57.8 per cent. below the same month of 1930.

The tabulation of permits issued in December, 1931, showing comparisons with December, 1930, and November, 1931, by states, follows:

	Dec., 1931	Dec., 1930	Nov., 1931
Alabama	$ 121,786	$ 221,133	$ 221,062
Arizona	191,025	474,666	182,394
Arkansas	911,873	141,246	39,763
California	6,507,369	13,867,158	7,179,534
Colorado	238,150	328,333	375,045
Connecticut	1,491,304	7,836,905	1,652,392
Delaware	67,648	123,207	321,477
District of Columbia	925,785	1,386,125	1,197,510
Florida	515,968	734,690	1,919,638
Georgia	181,018	489,760	359,892
Idaho	10,817	57,901	48,300
Illinois	4,423,063	4,661,062	1,653,878
Indiana	620,396	1,119,774	1,703,137
Iowa	480,126	828,807	632,595
Kansas	110,783	758,749	148,567
Kentucky	1 874,679	293,705	139,670
Louisiana	176,212	367,127	265,716
Maine	47,804	44,933	38,095
Maryland	828,150	1,875,274	1,790,121
Massachusetts	2,570,553	7,104,876	3,975,969
Michigan	892,327	6,176,672	1,186,966
Minnesota	3,103,424	2,715,464	1,016,419
Mississippi	16,095	131,882	79,818
Missouri	899,149	4,412,616	691,758
Montana	54,350	51,000	57,875
Nebraska	381,980	207,605	164,854
Nevada	21,425	44,950	72,200
New Hampshire	25,250	28,915	23,540
New Jersey	1,957,284	3,396,055	2,454,672
New Mexico	57,015	66,190	52,883
New York	14,961,237	40,738,611	22,208,416
North Carolina	808,873	274,349	541,935
North Dakota	65,850	372,260	39,175
Ohio	1,801,134	5,990,280	2,298,684
Oklahoma	226,732	2,731,949	392,462
Oregon	241,868	780,094	234,659
Pennsylvania	2,019,267	3,495,175	2,698,055
Rhode Island	411,273	1,102,785	1,165,600
South Carolina	191,358	122,439	156,456
South Dakota	280,175	355,925	196,133
Tennessee	343,189	508,543	819,885
Texas	2,653,016	5,024,571	2,891,198
Utah	90,249	149,739	72,596
Vermont	None	18,000	None
Virginia	209,669	469,221	493,013
Washington	435,196	5,805,647	615,119
West Virginia	125,296	154,111	71,557
Wisconsin	699,657	2,997,322	2,188,373
Wyoming	12,310	54,486	12,575
Totals	$55,279,157	$131,090,287	$66,721,631

Ward Sand & Gravel Co. Plant Damaged by Blaze

Fire caused a loss of approximately $8,000 at the plant of the Ward Sand & Gravel Co. at Oxford, Mich., recently. A supply house containing motors, belting, oil and grease was destroyed. An overheated stove in the office was believed to have caused the blaze. Fortunately the loss was covered by insurance.

C. T. W. Hollister Heads Northwestern Portland

James D. Burns of Condon, Ore., C. T. W. Hollister of Seattle, Wash., W. J. Kerr of Corvallis, Ore., Frank Kiernan of Portland, Ore., H. J. Metcalf of Eugene, Ore., and J. A. Rueter of The Dalles, Ore., were chosen directors of the Northwestern Portland Cement Co. at the annual meeting the stockholders held early this month at Seattle. The directors then named Mr. Hollister president, Mr. Reuter first vice-president, Mr. Kiernan second vice-president, and Mr. Metcalf assistant secretary. Carl W. Gath was appointed secretary and treasurer.

Freakish Weather Slows Up Gedney Island Work

Rough weather has delayed the construction of loading docks at the new Hat Island Sand & Gravel Co. operations at Gedney Island, near Everett, Wash., throughout the past month. During a three-week period, the pile-driving crew was able to work only two days, it was reported. The new plant is scheduled to begin producing and shipping material early this spring.

Arkansas Sand & Gravel Company Plant Is Sold

The plant of the Arkansas Sand & Gravel Co. located at Van Buren, Ark., has been sold by its owners, Frank Euper and R. C. Bollinger of Ft. Smith, to the Arkola Sand & Gravel Co. The Arkola concern operates several plants in Oklahoma, Arkansas and Mississippi, and the new owners are remodeling the newly acquired plant at Van Buren and plan increased output when the improvements are complete. Harry Barr, who has been in charge of the plant, and Edward O'Dell of Muskogee, Okla., will direct production when operations are resumed early in February.

Ohio Gravel Firm Holds Meeting, Names Officers

Stockholders of the Laura Gravel & Stone Co. of Phillipsburg, O., at their annual meeting held recently, elected the following officers: Edward Mattis, president; Robert Kraus, vice-president; I. E. Baker, secretary-treasurer. A note of optimism was sounded at the meeting when it was announced that the company had sufficient orders on hand to operate steadily for at least three months.

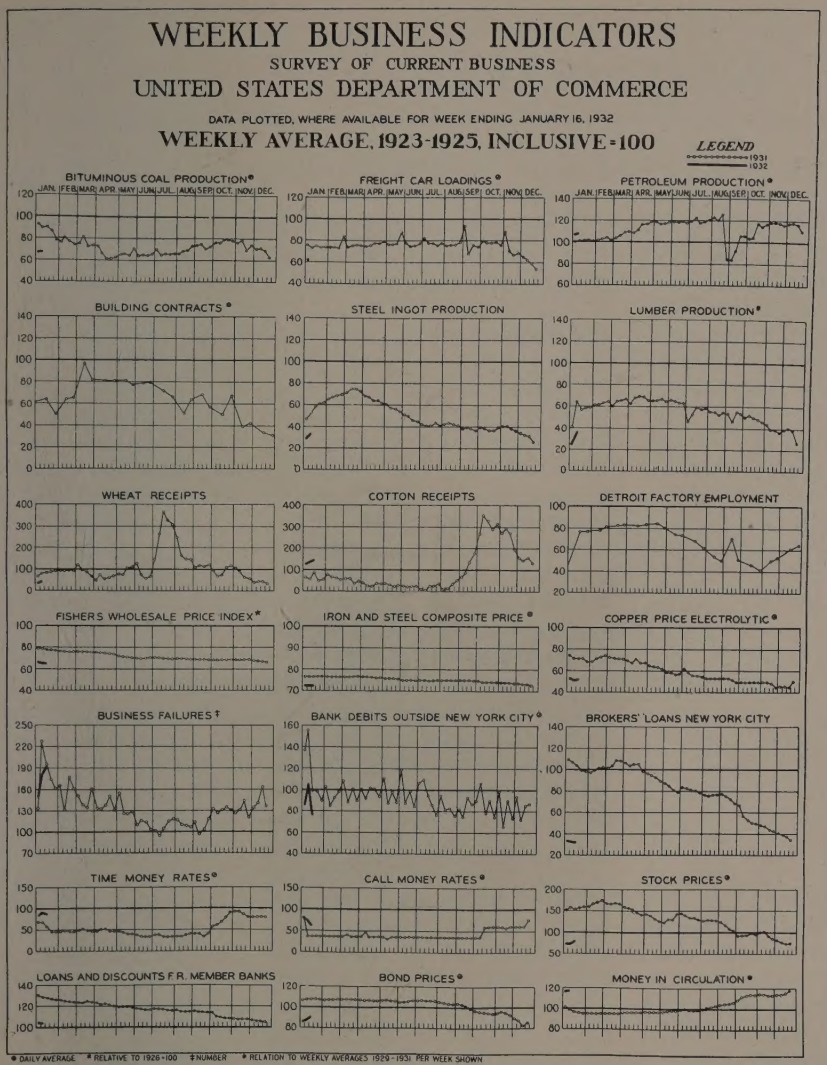
Pulverized-Stone Plant in Idaho in Operation

Operations have started at the new pulverized-stone plant of the Intermountain Mineral Products Co. The plant is located near Burley, Ida., and has a capacity of 25 tons daily. Crushing and pulverizing machinery, vibrating screens and baggers have been installed. M. M. Vea heads the concern and the product is being sold principally to poultry raisers.

BUILDING-MATERIAL PRICES, DECEMBER 1, 1931

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S Bureau of Standards.

City	Portland Cement (bbl.)	Gypsum Plaster (ton)	Gypsum Plaster Board (1,000 sq. ft.)	Hydrated Lime (ton)	Building Sand (cu. yd.)	Crushed Stone (ton)	Roofing Slate (100 sq. ft.)
Akron, O	$1.74	$14.00	$	$12.00	$1.50	$2.50	$12.00
Albany, N. Y	2.34	16.20	23.85	15.75			
Atlanta, Ga	2.40	19.75		15.00	2.81	2.50	
Baltimore, Md	2.10	14.50	25.00	13.00	1.85	2.50	10.00
Buffalo, N. Y	2.95	16.00	21.00	18.00	2.50	2.05	12.00
Cincinnati, O	1.94		22.75	14.40	2.63	2.55	
Cleveland, O	1.68	15.00		10.00	1.69	2.15	16.00
Columbia, S. C	2.28	15.40	35.00	11.00	1.50	2.60	14.00
Columbus, O	2.35	14.40		12.00	1.50	2.75	14.00
Des Moines, Iowa	1.82	14.00	23.50	18.00	1.40	4.15	15.00
Erie, Pa	2.10	16.00	22.50	16.00	2.00		
Fairmont, W. Va	2.75	18.00	35.00	16.00	2.80	3.50	13.00
Grand Forks, N. D	2.60	18.75		16.25	2.60		
Haverhill, Mass	2.32	18.50	25.00	20.00			
Kansas City, Mo	1.68	15.00	25.00	24.00	1.60	2.25	16.00
Lansing, Mich	2.25	17.50	20.00	20.00	1.80	1.80	
Los Angeles, Cal	2.30	15.20	23.50	24.70	1.85	1.90	
Louisville, Ky	1.86	17.00		15.00	2.00	2.15	
Milwaukee, Wis	1.25	15.20	22.00		1.25	1.25	
New Bedford, Mass	2.40	16.50	24.00	16.50	1.50	2.75	
New Haven, Conn	2.40			15.00	1.50	2.00	
New London, Conn	2.60	18.00	25.00	18.00	1.50	3.00	
New Orleans, La	2.20	18.00		13.00	1.85		11.00
Paterson, N. J	2.00	17.50	24.00	18.00	1.50	2.10	12.00
Philadelphia, Pa	2.10	17.50		13.75	1.75	2.60	11.22
Poughkeepsie, N. Y	1.95	13.00		26.00	2.25	2.20	
Richmond, Va	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y	2.28	16.00	22.00	20.00	2.25	2.40	12.00
St. Louis, Mo		16.00		16.00	1.35	1.30	13.00
St. Paul, Minn	2.15	17.00	21.00	19.00	1.25	1.75	11.50
San Antonio, Tex	2.42	17.00	42.00	20.00	2.25	2.35	16.50
San Francisco, Cal		16.90	45.00	22.50	1.40	1.60	12.50
Savannah, Ga	2.25	16.00	25.00	20.00	1.75		
Scranton, Pa	2.40	19.00		20.00	3.25		
Seattle, Wash	2.40	18.00	35.00	22.00	1.40	1.50	
Sioux Falls, Ia	2.00	15.00	40.00	22.00	1.25	2.25	
Tampa, Fla	2.60			24.00	2.75	2.80	
Terre Haute, Ind	2.00	18.00	28.00	18.00	1.25	3.00	13.25
Toledo, O	1.40	14.00	21.00	14.00	1.60	1.75	
Trenton, N. J	2.20	17.00	24.00	17.00	.95	1.85	10.00
Tucson, Ariz	3.45	17.10	45.00	30.00	1.25	2.25	
Tulsa, Okla	1.90	16.00	22.50	22.50	.85	2.35	
Washington, D. C	1.65	14.00	25.00	12.00			
Waterbury, Conn	2.60	20.00	30.00	20.00	1.25	2.45	15.00
Youngstown, Ohio	2.43	18.00	23.25	16.00	2.50	2.50	14.00



Producing Rock Asphalt from New Mexico Quarry

A. B. Hebenstreit, president of the New Mexico Construction Co., Denver, Colo., reports that a new rock-asphalt quarry, seven miles north of Santa Rosa, Guadalupe County, New Mexico, is being operated by the Santa Rosa Quarries Co., Denver, Colo., a subsidiary of the New Mexico Construction Co. Sandstone, 30 to 80 ft. thick, containing on an average 7 per cent. of bitumen under 4 to 20 ft. of overburden, is being quarried by steam shovel and conveyed by trucks to the mill. It is crushed to ⅜ in. and mixed in a pug-mill with about one per cent. of petroleum asphalt and shipped by truck 7½ miles to the nearest railroad. As sold, the finished product contains 7 to 8 per cent. of bitumen and is ready to lay.

Lehigh Reopens Cement Plant at Mitchell, Ind.

W. H. Weitknecht, superintendent of the Lehigh Portland Cement Co. plants at Mitchell, Ind. reports that Plant No. 2 has resumed operations and will continue at full capacity until summer. A total of 275 men went back to work bringing the total number to 290.

The company has received a contract from the State Highway Commission for 33,000 bbl. of cement and this will keep the plant busy until about July, according to reports. It is hoped that additional orders by that time will permit the mill to continue to operate.

The plant had been closed since October 15.

New Gravel Concern to Develop Mound Deposit

Spanish Hill, a picturesque mound located along the Chemung River near Sayre, Pa., is to be leveled by the newly-organized Hornell Gravel Corp. The hill covers 37 acres and is said to be composed of high-quality sand and gravel. A modern washing and screening plant is to be erected on the site.

T. H. MacDonald Gets 1931 Bartlett Award

HIGH HONOR TO ROAD BUILDER

Because of his outstanding contribution to highway progress, Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads for the last 12 years, has been presented the newly-established George S. Bartlett Award. The presentation was made at the annual meeting of the American Road Builders' Assn. in Detroit.

The George S. Bartlett Award, created jointly by members of the American Assn. of State Highway Officials, the American Road Builders' Assn. and the Highway Research Board, has a two-fold purpose. It honors Mr. Bartlett, well-known in the cement industry, whose vision, energy and personality have made him a prime factor in the spread of modern highways. Secondly, it will honor each year some individual whose interest in highways has been of national benefit.

The Bartlett Award consists of a bronze wall plaque which bears a portrait head of Mr. Bartlett. It carries the inscription, "George S. Bartlett Award" and "For outstanding contribution to highway progress." Friends of Mr. Bartlett from all over the western hemisphere contributed funds which provide a permanent endowment for this award.

Mr. Bartlett, who has been identified with the Portland cement industry for the last 43 years, advocated the paving of rural roads about the time it was first seen that the automobile was to enter seriously into the country's economic life. Throughout Mr. Bartlett's many years of activity he has become known as an able exponent of good will as well as a powerful advocate of good roads. He is a member of the staff of the Portland Cement Assn. and was formerly connected with the Universal Atlas Cement Co.

Aggregates Producer in Iowa Plans Expansion

Articles of incorporation have been filed at Cedar Rapids, Ia., by the Larimer & Shaffer, Inc., Co., producers of gravel and sand and quarried products. Capital stock of the incorporation is set forth at $250,000 which supersedes a partnership that had its inception 30 years ago. Robert I. Larimer is president; Gustave A. Shaffer, vice-president, and R. Vincent Roupe, secretary-treasurer.

The incorporation will give the firm an opportunity for much needed expansion. Sand-and-gravel production is now 2,000 tons a day.

The quarrying end of the business, started in August, 1931, has for its location a 180-acre deposit. It is expected that production will be stepped up from 800 tons to 1,000 tons daily during 1932.

Editorial

The Contractor as a Pre-Mixed-Concrete Producer

IN many quarters lately there has been talk of the desirability of contractors entering the pre-mixed-concrete business as producers rather than as purchasers. Chief among the arguments advanced in favor of this broadening of the contractor's usual sphere of action is the fact that he has a thorough knowledge of concrete manufacture and the many difficult problems involved in it. Another point mentioned is the fact that he can use, in fulfilling his own contracts, a large portion of the output of any pre-mixed-concrete plant which he might build. A third claim is that this form of development affords an opportunity for expansion of his business in natural directions.

While it is true that examples can be cited to support the first two of these contentions, equally or even more powerful cases can be cited to illustrate the difficulties inherent in pre-mixed-concrete production by contractors. The third point mentioned, if valid, might with almost equal reason be pushed to include the production of the cement and aggregates involved in concrete production, since these operations, as well as the production of pre-mixed concrete, involve problems in which he can not be claimed to be skilled or even experienced. The making of concrete on the job is one thing, and with that the contractor is admittedly familiar. The making of pre-mixed concrete, however, whether this be done in a central-mixing plant or *en route* in portable mixing plants supplied with materials proportioned and perhaps dry-batched in a central plant—is quite another matter. No one realizes this more clearly than the contractor who, thinking the pre-mixed-concrete business a simple and logical development of his own activities, has embarked in it only to find that he has attempted much more than either his experience or means enable him to accomplish and to learn that the efficient operation of a factory designed for mass production is on a different plane from that on which the operation of small isolated concrete mixers is conducted. It may be and undoubtedly is a simple matter successfully to operate a small mixer, whose production of concrete is not required to show a profit but is tolerated as a necessary, even though wasteful, step in his general construction program. It is something entirely different, however, to produce pre-mixed concrete for a considerable number of different customers, to deliver it to them at widely-scattered points in the exact quantities, in the qualities, and at the precise moments required by a variety of situations, and to realize a profit sufficient to warrant the large investment necessary.

All which indicates in ample detail that experience in making concrete according to contractors' on-the-job standards and methods is not enough to fit contractors for pre-mixed-concrete manufacture on a large scale. The operation of a central plant of any kind, the entire theory of mass production, is wholly outside the experience—we might even add the understanding—of many contractors who essay to enter the pre-mixed-concrete field, and this has been amply demonstrated by the unfortunate experiences of many who have tried it and failed. The business of making pre-mixed concrete according to the high standards that prevail in every typically-modern pre-mixed-concrete plant calls for experience, knowledge and skill such as the contractor has not been required to possess in his own business, and in most cases it is very doubtful whether the cost of acquiring those qualities and of encountering the risks involved in making the test of his ability and means will be justified by the degree of success he can ordinarily achieve.

The fact that a contractor may be able to utilize on his own jobs a large portion of the output of a pre-mixed-concrete plant hardly justifies his entry into a business whose product must find its principal uses at others' hands. The difficulty—perhaps, even, the impossibility—of rendering satisfactory service to other contractors when his own demands press upon him adds a further reason to the many that should caution him against making the venture. Few men are able to exercise impartiality among their customers, and when one of a pre-mixed-concrete producers customers is himself and the others are his competitors the likelihood of accomplishing equality of service between all customers becomes extremely remote.

The production of high-quality pre-mixed concrete is more than the mere proportioning and delivery of cement and aggregates at specified times and places. It reaches back to the production of the aggregates themselves, and surely no one will contend that the contractor should properly extend his activities to include the production of his raw materials. But since the question of concrete quality involves the quality of the concrete's ingredients, it may very properly be left to those concerned with raw-material production, as has been amply demonstrated where aggregate producers have entered the business of pre-mixed-concrete production. Certainly it is more reasonable to extend the production of aggregates, where the quality of concrete is to a great extent determined, to include the making of pre-mixed concrete than it is to extend the production of concrete in isolated instances and for a single customer backward to include the production of centrally-manufactured concrete for a large market composed of many customers. While the one is a step forward and leads toward refinement of the product and greater satisfaction for the consumer, the other is a step backward and leads

toward dissatisfaction among customers who must buy from their competitor.

The pre-mixed-concrete industry stands at present in a middle position. It buys its raw materials from a few sources, manufactures them into a salable product, and distributes this to many different customers. If the producer of the raw materials elects to manufacture a product that utilizes his materials, that is a normal economic development, since it tends toward the provision of a better product at a lower cost and simplifies the costs of distribution by eliminating one profit. But, when the consumer of a product decides to manufacture that product and sell it to his competitors, that is an abnormal economic development, since it does not tend toward the provision of a better product at a lower cost and it does not simplify the costs of distribution by eliminating a profit.

These truths are clearly shown in the experiences of contractors and aggregate producers who have entered pre-mixed-concrete production. The successes of the latter have been more numerous and more conspicuous than those of the former group, largely for the reasons just stated, although the individual financial strength of those in the former group has generally been greater than that of those in the latter group. The independent pre-mixed-concrete producer who originates in neither group takes nothing vital from either group. He supports the producing group by his purchases and he relieves the contractor group of a function—the making of concrete—which really does not belong within the scope of the latter's proper activities and has been allowed to remain there only because, until recently, no alternative method was available. The contractor is not a manufacturer; he is a builder. His function is the employment of men who combine and erect various manufactured products into a completed structure. The labor of his employees is expended irregularly at various places, and his service is in the nature of itinerant labor. His service is still largely performed by hand labor, and he uses no factory processes. The manufacture of pre-mixed concrete, on the other hand, is essentially a factory activity. It demands centralized equipment and control, it utilizes huge quantities of raw and manufactured materials, and it turns out its product under conditions known as mass production.

Furthermore, the pre-mixed-concrete producer of the usual type—that is, either the one born of the aggregate producer or the independent operator—reduces the cost of concrete structures, either by selling his product below the cost of making a similar product on the job, or by reducing the number of men required by the contractor in placing it, or in both ways. He seeks his profit in the rendering of a superior service at lower cost. The contractor who enters the business usually has different aims, principal among which is his desire to reduce the cost of making the concrete he uses on his own jobs. He operates under the difficulty already mentioned of being unable to treat his competitor customers as he treats himself, and it necessarily follows that his service, under those conditions, will be neither as satisfactory or as economical as that of the producer who does not buy from himself and is, therefore, not tempted to favor himself above his competitors.

Crank-Case of Plant Locomotive Is Repaired by Bronze-Welding

Large and heavy castings are nearly always expensive to replace. This is particularly true when the casting is an essential part of a machine in daily use. For, in addition to the cost of the casting, must be included the cost of the production time lost by the disabled machine. The oxy-acetylene process has often proved its value in providing a quick and efficient medium of repair for such castings and a recent occurrence on the west coast again demonstrated these qualities.

A sand-and-gravel producer was using an 8-ton, 36-in. gauge locomotive powered by a four-cylinder gasoline engine for hauling dump cars from the pit to the washing and screening plant. Operations were brought to a standstill by the fracture of the heavy cast-iron crank-case of the motor, the break extending from the middle of one end along the side about two-thirds of the entire length of the casting. The broken piece included a machined joint as well as a ball-bearing holder, so that it was vitally necessary that the machined surfaces be kept in perfect alignment. Bronze-welding was decided upon to repair this casting since it provided the quickest means to restore the locomotive to service.

The edges of the fracture were beveled to give a good "V" for welding. In order to maintain the proper alignment, clamping bars 2½ in. square, cut to the necessary length, were used to bolt the broken section in position. A temporary preheating furnace of fire brick was then built around the casting. Ordinarily it is unnecessary to preheat a casting before bronze-welding, but to make doubly sure that there would be no distortion or misalignment it was decided to preheat this job. A charcoal fire was used and the casting was preheated for several hours. This allowed both the crank-case and the clamping bars to expand uniformly and permitted the welding operation to be carried on without any possibility of distortion. After the welding was completed the casting was allowed to cool down slowly to room temperature.

The crank-case was then replaced on the engine and it was found that the machined parts lined up perfectly, no filing or machining being necessary. The superintendent estimated that the cost for dismantling, preparation for welding, bronze-welding and assembly amounted to less than 1/5 of the cost of a new casting. Furthermore, the locomotive was out of service but three days instead of the several weeks which would have been necessary to cast and ship a new crank-case.—*Oxy-Acetylene Tips.*

Crushed-Stone Producers Seek to Free Industry from Confining Shackles of Regulatory Laws

Determination and Seriousness of Purpose Characterize Sessions at Annual Convention in Pittsburgh; A. L. Worthen Again Chosen President

AS was to have been expected in times like these, the difficulties of doing business as usual under existing anti-trust laws, especially when one seeks to correct some of the evils of the present situation and to prevent, if possible, their recurrence, were topics of lengthy and earnest discussion during most of one forenoon during the annual convention of the National Crushed Stone Assn. held January 19-22 at Pittsburgh. Except for a paper on the requirements of airport pavements, which had no relation to the release of business from the shackles that confine it, and another on the adoption of a uniform accounting system, which touched one of the many avenues of promised escape from our most serious business troubles, all the speakers of that session attacked important phases of the present state of business and some of the more significant of the numerous subjects that affect it. The viewpoints presented were those of the lawyer and the economist and they showed the results of thoughtful and intelligent consideration of the topics discussed. They gave further evidence of the seriousness, the determination, that characterized all the sessions. Whatever the attendance may have lacked in point of numbers was more than compensated for by the increase in attentiveness, a fact that was widely commented upon by speakers, listeners, and exhibitors. While there were, as there always are, many who went for the lighter and more pleasurable sides of convention activities, most men went for serious purposes, to observe, to discuss, to learn, and to help, and they came away refreshed, physically tired but spiritually renewed.

The opening day's sessions were begun with the customary courtesies of welcome by Pittsburgh's political representative, John S. Herron, president of the city council, who extolled the steel city's virtues and lamented the fact that Pittsburgh did not at the moment exhibit that feverish activity which is the city's boast in better times and that, instead, it lay temporarily dormant during what former Governor Fisher of Pennsylvania at lunch facetiously referred to as a "regular Democratic depression."

President Worthen, who, through the unanimous action of the voting membership present at a later session, was reëlected to his office for another year, made a brief address in the manner so characteristic of him, concisely and modestly. He pointed out, with a frank recognition of the just claims of competitive materials, that it is ridiculous to expect that stone—or, he might with equal truth have added, any other material—will be the predominant material in spite of economic facts, and he emphasized the truth that the extent of its future use will depend on its suitability and advantages for various purposes and the ability of stone producers to demonstrate and prove its superiority. The huge sums now invested in stone-producing plants can be safeguarded, he said, by supporting the association's work in research and engineering, which will provide the data by which stone's important and useful qualities can be shown. Although the association's research and engineering activities cost the organization's members $25,000 yearly, twice as much could profitably be spent, in his opinion. He deemed the association fortunate in having the services of A. T. Goldbeck, who is not only the organization's engineering director but also, as Mr. Worthen opined, the foremost highway engineer in the country. He referred to the work of the Research Advisory Committee, a group appointed by him early last year to suggest subjects for research work, and to the board's authorization to raise $10,000 to defray the cost of further activities. The association's Bureau of Engineering under Mr. Goldbeck's direction has built a new type of testing machine—

One of the high spots of the fifteenth annual convention of the National Crushed Stone Assn. was the banquet held Thursday evening, January 21, in the ballroom of the William Penn Hotel. A picture taken during this event appears at the left. Paul B. Reinhold acted as toastmaster.

ATTENDANCE AT THE CONVENTION

Members' Representatives	160
Producing companies' representatives (Companies represented, 53)	150
Association employees	10
Associate Members' Representatives	165
Equipment-manufacturing companies' representatives (Equipment-manufacturing companies represented, 62)	155
Trade-publication representatives (Publications represented, 2)	10
Guests (Ladies present, 30)	129
Total attendance	454

LARGE GROUPS IN ATTENDANCE

	Representatives Present
Members:	
General Crushed Stone Co.	30
Carbon Limestone Co.	10
Connecticut Quarries Co.	8
Callahan Road Improvement Co.	6
New Haven Trap Rock Co.	6
John T. Dyer Quarry Co.	5
(Four companies had 4 representatives each; 5 had 3 each; 16 had 2 each; and 22 had 1 each.)	
Associate Members:	
Bucyrus-Erie Co.	7
Burton Explosives, Inc.	7
Marion Steam Shovel Co.	6
PIT AND QUARRY	6
Robins Conveying Belt Co.	6
E. I. du Pont de Nemours & Co.	5
(Eleven companies had 4 representatives each; 9 had 3 each; 18 had 2 each; and 21 had 1 each.)	

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the first of its kind—for testing bituminous mixtures used in road work.

Referring to the outlook for business, Mr. Worthen mentioned the improved situation of the railroads and the resultant certainty that they would soon buy more actively, and mentioned the disappearance of some of the weaker producers and the resultant betterment in the competitive situation. He advocated a close study of costs and continuous support of the association as certain steps forward in the direction of revived business.

He then called upon those directors who were present for brief reports on business conditions and the outlook in their respective territories, a symposium that revealed some interesting local conditions and a rather general expectation of improvement. According to Max A. Altgelt (Servtex Materials Co., New Braunfels, Tex.), business in 1931 was only 60 per cent. of that in 1930 and prices reached the levels of 1914. He does not think the outlook bright.

In the Virginia area 1931 business was only about 11½ per cent. below 1930's in ballast and commercial stone, while prices fell 10 per cent., in the opinion of L. J. Boxley (Blue Ridge Stone Corp., Roanoke, Va.). He expects 1932 ballast business to equal last year's but road work to be reduced by $1,500,000.

Business in the Chicago district was equal to only two-thirds of that of 1930 and one-third of that of 1927, and prices were low during the last half of last year, according to O. P. Chamberlain (Dolese & Shepard, Chicago).

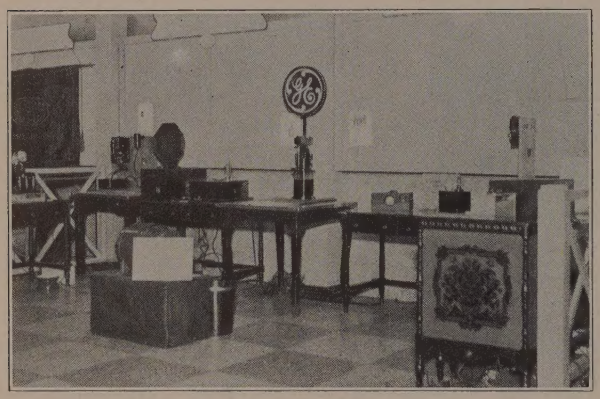
F. O. Earnshaw (Carbon Limestone Co., Youngstown, O.) said that there had been no spring pick-up in 1931 and that road work had been late in starting, with the result that business for the year was lower by from 35 to 40 per cent. Many miles of roads must be serviced this year, and this should help business.

In reporting for Connecticut and Rhode Island W. E. Hilliard (New Haven Trap Rock Co., New Haven, Conn.) said that production had been from 25 to 30 per cent. below the previous year's and that prices had been somewhat lower. The demand for ballast had been limited to that required for maintenance. The present year will not be distinctly better, he thinks. In the opinion of A. S. Lane (John S. Lane & Son, Meriden, Conn.), whose report covered some of the same territory, prices remained about as they had been, but business was 18 per cent. less than in 1930 and road work about 6 per cent. less. He expects 1932 to be about the same as 1931.

The report of John Prince (Stewart Sand & Material Co., Kansas City, Mo.), who was not present, placed 1931 business 20 per cent. lower than the

preceding year's, prices 17 per cent. lower, and sales 33⅓ per cent. lower. This year, in his opinion, construction may be less than in 1931 but road work may compensate for that loss. In 1931 the volume of building permits was the lowest in 30 years.

The report of John Rice (General Crushed Stone Co., Easton, Pa.) was read by Otho M. Graves, president of his company. It stated that shipments in 1931 had been equal to or better than those of 1930, and that, while prices had fallen, costs had likewise gone down, so that the situation did not reveal much change. He believes that the stone industry has suffered less than many other industries,



First prize went to the General Electric Co. for this display.

and thinks that courage and self-confidence are needed in the present situation.

The Buffalo territory escaped the price war that affected most of the country last year, said James Savage (Buffalo Crushed Stone Co.). On account of reduced budgets for road work and the condition of the railroads, he expects 1932 business to be smaller. He hopes that the "live-and-let-live" policy, which characterized business in Buffalo last year, will prevail in 1932.

This year will be 50 per cent. better for the stone business in the Davenport section of Iowa than 1930, reported J. F. Schroeder of Davenport, Iowa. He expects a good business in agricultural limestone. In 1931 general stone business was 58 per cent. of that of a normal year's in volume and only 50 per cent. of normal in value.

From Rocky Point, Va., John W. Stull reported 1931 business smaller because of a 40-per cent. decline in building. The railroads bought their normal amounts of ballast. This year should be equal to last year, he believes.

Last year's business was very good in South Carolina, according to T. I. Weston (Weston & Brooker Co., Columbia, S. C.), but 1932 appears to offer no improvement. Little work will be done in North Carolina and the situation in South Carolina is uncertain. Business in Georgia will be about normal, he thinks.

Reporting from Schenectady, N. Y., J. E. Cushing (Cushing Stone Co.) said that prices and collections had reached new low levels in 1931 and that the prospects for 1932 do not appear better.

J. L. Heimlich (Le Roy Lime & Crushed Stone Co., Le Roy, N. Y.) said that the business in road stone had been fair in 1931 but that railway-ballast demand was only 30 to 40 per cent. of normal. Prices were lower. Work for 1932 will undoubtedly be reduced because of the inability of taxing bodies to collect their taxes.

According to E. J. McMahon (St. Louis Quarrymen's Assn.), Southern Illinois producers had a bad year as state road work was delayed by litigation and other work was below normal. Price-cutting by some producers also had a serious effect on business. He considers the outlook for 1932 encouraging.

Crushed-stone production was 25 per cent. below normal, due largely to the fact that sales for railway ballast were 95 per cent. lower than usual, reported Bernard A. McKinney (West Roxbury Trap Rock Co., West Roxbury, Mass.). Welfare work absorbed much of the money that normally would have been spent for construction work. The prospects for 1932 are better.

The volume of crushed-stone production and the prices obtained for it were the lowest in years, according to Russell Rarey (Marble Cliff Quarries Co., Columbus, O.). The sales of road and commercial stone were only 80 per cent. of those of 1930, ballast sales amounted to but 30 per cent. and chemical-stone sales 40 per cent. of those of 1930. These losses were compensated for to some extent by lower wages and lower production costs in other directions. No improvement in 1932 is apparent.

J. A. Rigg (Acme Limestone Co., Alderson, W. Va.) reported that ballast business had been fair and other business normal in 1931. The ballast outlook for 1932, however, is not as good but that for construction appears better as the state will carry through a normal program. Generally prices were too low to allow profits, although recent contracts have been let at good prices.

Production was 20 per cent. below normal last year and prices were considerably lower, according to F. W. Schmidt, Jr. (North Jersey Quarry Co., Morristown, N. J.). The outlook for 1932 is not encouraging because of the inability of municipalities to sell bonds. He expects prices to remain about the same.

Production in 1931 was lower than in 1930 and prices were lower during the last half of the year, reported E. Lee Heidenreich, Jr. (New York Trap Rock Corp., Newburgh, N. Y.). He expects the same conditions to prevail this year.

W. L. Sporborg (General Crushed Stone Co., Syracuse, N. Y.) found stone business and stone prices 10 per cent. below the 1930 levels, but the quality of the product higher. He expects 1932 production to be about 80 per cent. of that of last year.

Telegraphing from California, A. J. Wilson (Granite Rock Co., Watsonville, Cal.) reported 1931 sales about half as large as those of 1930, with little ballast business. He looks for a 10-per cent. improvement this year.

A LARGE number of members, guests and associate members were present at the greeting luncheon, at which the Hon. John S. Fisher, former

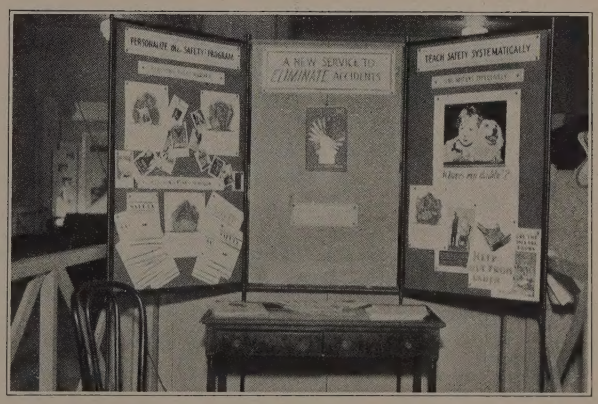
Governor of Pennsylvania, was the guest of honor. The subject of his address was "The Value of Good Roads," a topic on which he was well qualified to speak, having been one of the pioneers in the good-roads movement in the State of Pennsylvania. He reviewed the progress in road building in the state and particularly in and around Pittsburgh, where, he stated, are some of the finest existing examples of the seemingly insurmountable difficulties which have been overcome to provide adequate highways to and arteries in Pittsburgh.

At the session following the luncheon the first speaker was H. P. Chapman, assistant director and chief engineer, Ohio Department of Highways. His subject was "Methods of Reclaiming Old Macadam Roads." He went into considerable detail describing the methods in use in Ohio and their success, and illustrated his talk with numerous lantern slides showing typical reclamation projects in their various stages and after completion. He particularly stressed the fact that the problem of resurfacing and widening existing highways is the most important one now confronting those interested in highway building.

Dr. H. S. Hulbert, Chicago psychiatrist, whose paper presented before the previous convention at St. Louis was one of the high spots of interest at the 1931 gathering, spoke all too briefly—considering the nature of his subject—at the afternoon session. His topic, "Modern Usages of Ancient Inherited Mental Tendencies," was worthy of much more extensive treatment than he was allowed to give it, but its relation to the problems of crushed-stone producers was not as evident to many of his listeners as he evidently thought it would be. The subject was not above the intelligence of his audience but it was, unfortunately, outside their interests at the moment and therefore did not arouse the enthusiasm with which his address of the preceding year had been received. His hearers had come with serious minds, it is true, but not many of them were prepared to follow through with the thinking which his ideas suggested. His address, brief as it was, carried a message filled with inspiration for those who interpreted it properly, and a greater exercise of the mental tendencies whose evolution he depicted—courage, generosity, and good sportsmanship—would do much to relieve the general situation which confronts business men. He traced the development of these ideas backward to their genesis and showed that they represent the highest achievement of the human mind.

Dr. George D. Beal, assistant director of the Mellon Institute of the University of Pittsburgh, in discussing "Science in Industry," spoke of some of the more spectacular evidences of what science has accomplished in the improvement of industry through the development of by-products, the creation of new products, and the discovery of new uses for old products. He cited instances in which the value of the by-products of certain industries became so important that old and inefficient methods of manufacturing the basic product were retained because of the great profit to be derived from the by-products that resulted from the use of the old ways. He said that industrial research could often increase the selling possibilities of an old product either by finding new markets for it or by so altering it that it would be suitable for new uses. In his opinion scientific research could be an important factor in stabilizing business, and much could be expected by crushed-stone producers from the research activities of their association's engineering bureau.

Dr. Beal stressed the fact that science, in order to be of the greatest possible value to industry, must keep close contact with advertising and sales departments in order that a demand can be created for the products resulting from its efforts. Cessation of research, according to him, would be fatal to industry as it is the backbone of industrial progress. Trade associations were credited by him with being one of the prime movers behind industrial development and he recommended expansion of research facilities during present business conditions as a means of developing new markets for the products of industry. All members of all trade associations, said Dr. Beal, have similar problems and very few individuals or companies are able to conduct adequate research alone. Associations are able to conduct more intensive research benefiting the entire industry without the duplication of effort and the resultant high cost of research conducted by individuals. He advised his hearers to support their association not only with their purses but also with their resources of information and experience, so as to insure the future prosperity of the industry.



The National Safety Council exhibit.

P. B. Reinhold's report on the activities of the Research Advisory Committee requested members to support their research department and research committee with personal encouragement and cooperation. He summarized the work done by the association's engineering bureau and, in outlining that to be done in the future, emphasized the importance of deriving the fullest benefits from this work by giving it the proper publicity. He spoke of the value to the crushed-stone industry of the tests being conducted by cities, counties, and states.

In commenting on this report, A. T. Goldbeck, head of the engineering bureau, explained that the committee had recommended at the beginning of the year concentration on problems concerning rail-

road ballast, stone sand, and low-cost roads. As a result, extensive research was conducted during the year on stone-sand gradation and on workability. Low-cost roads also received their share of attention. A circular track, 16 ft. in diameter, was built in the association's laboratory in order to test the stability of various materials. This machine employs a heavy wheel, which compacts the materials in a manner that produces results simulating the effects of actual traffic, and it is provided with means for constant temperature control. Prospective uses for the materials tested were also investigated.

THE Wednesday morning session was opened by P. J. Freeman, chief engineer, Bureau of Tests and Specifications, County of Allegheny, Pittsburgh, Pa. His subject was "The Effect of Coarse Aggregate on the Durability of Concrete." Mr. Freeman stated that the year 1932 would in some ways be a more difficult one than was 1931 for the crushed-stone industry. Considerable research work is being done on the production of better concrete, which will result in stricter specifications for aggregates. Any such changes in aggregate requirements will, of course, put most operators to considerable trouble and expense. He also discussed some of the characteristics of various types of stone under tests. It is possible, for example, for sound stone to be more absorptive than unsound stone. The most important test for argillaceous limestone, which is what most producers are interested in, according to Mr. Freeman, is the soundness test. An unsound stone will invariably contain more insoluble fine material than a sound stone.

A number of slides were shown to illustrate the effects of using unsound stone in various types of concrete work. In many cases sound and unsound stone were used in adjoining sections of the same piece of construction and the results, after a period of wear and exposure, were thus made plainly evident. Various quarry faces showing the appearance of the two types of stone were also illustrated. According to Mr. Freeman, much of the failure of apparently sound stone is due to the presence, in microscopic quantities, of a little-known clay.

The next paper, "The Trend in Specifications for Crushed Stone," was presented by H. S. Mattimore, engineer of tests and materials investigation, Pennsylvania Dept. of Highways, Harrisburg, Pa. He stated that the most vicious type of specification, that in which the clauses are vague and indefinite, is rapidly disappearing and is being replaced by definite specifications which are advantageous to all concerned. He also characterized as a definite forward step the present trend toward the shipment of aggregates in two separate sizes to reduce segregation and possible rejection.

A feature of the Hercules Powder Co. display was a goldfish bowl filled with blasting caps. Visitors recorded guesses on the number contained therein.

Mr. Mattimore stated that the tendency to use smaller sizes of stone in order to reduce the amount of cement required was a dangerous one, as this practice results in a concrete not easily workable. The standardization of sizes, he said, is a future advantage soon to be realized. He then discussed the many gradations of stone required for various types of pavement and the consequent necessity for proper supervision and field inspection. In closing, he recommended to the members of the association that it increase its research staff in order to broaden the scope of its investigations in this field.

"Dolomite Sand in Concrete for the Henley Street Bridge, Knoxville, Tenn.," was the subject discussed by L. M. Dow, supervising and designing engineer, Knoxville. This bridge is a recently-completed $1,000,000 structure in which pre-mixed concrete and dolomite sand were used. The coarse aggregate used on this job was furnished by the Ameri-

Delegates from everywhere hazarded guesses on the weight of this chunk of stone in the Bucyrus-Erie Co. booth.

can Limestone Co. from its Holston quarry. Both dolomite sand and river sand were considered for use as fine aggregate. When it became known that the former was being considered rumors became current that this material was responsible for the disintegration of several structures in which it had been used. Investigation showed these rumors to be false. As dolomite sand had never been used on a project of this size, however, said Mr. Dow, the engineers decided to subject it to rigid tests.

Both chemical and physical tests were made by the engineers and by a number of responsible testing laboratories with the result that the dolomite sand was found to be superior in every way. A geological study also proved favorable and the results of sodium-sulphate soundness tests confirmed the previous findings.

As a result of this investigation, which was ad-

mittedly based upon theory, it was decided to use dolomite sand for this project. The regular tests made during construction, said Mr. Dow, were entirely satisfactory, and the concrete was plastic and easily workable with little honeycombing. Mr. Dow concluded his talk with the remark that dolomite sand of this type, if properly washed and graded, is satisfactory in every way for every purpose for which ordinary sand is used.

The discussion following the presentation of these papers was led by Robert L. Fox, city engineer, Bethlehem, Pa., where stone-sand has been in use for six years. He pointed out the opportunity for crushed-stone-plant operators to utilize what has formerly been a waste product for this purpose. The good qualities of this product and the savings which the city of Bethlehem has made through its

Crusher exhibit of Earl C. Bacon, Inc.

extensive use were also brought out. Mr. Fox then told of the results of a questionnaire to which he had received replies from the highway engineers of 29 different states. Of these, 14 allow stone-sand to be used in proportions varying from 25 to 100 per cent. of the total amount of sand used. Of the remainder, 4 not permitting its use said there was no demand for this material, as regular sand was cheap and plentiful. Twelve not permitting its use had not made any tests of this material. Among the states permitting the use of stone-sand were: Tennessee, Vermont, Georgia, Ohio, Michigan, Massachusetts, New York, West Virginia, Connecticut, Minnesota, and a number of others.

Mr. Fox closed his discussion with the statement that the greatest handicap to the use of stone-sand has been the lack of interest shown by the producers. In his opinion, this huge potential market justifies considerable research and expense on the part of the crushed-stone industry and its association.

Charles M. Upham, engineer-director, American Road Builders' Assn., Washington, D. C., in discussing "A Plan for Stabilizing the Highway Building Program," briefly outlined the development of highway construction in the past and stated that the road-building program for 1932 was only slightly smaller than that of the past year. This program will, however, be considerably reduced by

A model gyratory crusher in sections on display by Traylor Engineering & Mfg. Co.

tax reductions and the inability of communities to collect their taxes.

Mr. Upham also commented on the increasing extent to which gas taxes are being diverted for other purpcses than those for which they were originally intended. The construction of highways properly designed and located is one of the best and soundest investments it is possible to make. The extent to which unskilled labor is used in road construction also makes it an ideal means of providing work for the unemployed. In closing he mentioned the success of the annual convention of the American Road Builders' Assn. which was held during the preceding week in Detroit. He informed those present that an advisory council is being formed by this and seventeen other organizations for the stabilization of highway building to counteract the present agitation against highway construction and improvement. He invited the National Crushed Stone Assn. to join in this movement, which is also opposed to the diversion of gasoline taxes to any other than highway purposes.

President Worthen in a brief response pledged his personal support of the speaker's suggestions and stated that he would bring the matter before the board of directors for consideration.

AT the sales problem group meeting, held on Wednesday afternoon, Chairman J. A. Rigg introduced A. T. Goldbeck, director of the association's Bureau of Engineering. Mr. Goldbeck's address was entitled, "Do you Know," and in it he stressed the necessity for the salesman knowing the strong points, uses, and other important facts about the product he is selling. He should have a knowledge of the kind of stone it is, whether it is sedimentary, igneous or metamorphic; he should have a fundamental knowledge of concrete, its design, yield, etc.; some knowledge of common testing methods, gradation for workability, fire resistance, permeability, and other important facts concerning crushed stone and its uses. A chalk talk accompanying this discussion was used to illustrate his statements.

Mr. Goldbeck elaborated on the effect of dust-coated stone on concrete (where it is negligible) and on bituminous mixtures (where it is consider-

Nordberg Mfg. Co. booth displaying Symons cone crusher.

ably more harmful). The best gradations for stone-sand to be used for concrete, he said, had a fineness modulus ranging from 2.6 to 3.0. A method for determining the ratio of workability of aggregates on which he has been working was also described. The use of two sizes of aggregates, said Mr. Goldbeck, increases the workability of a concrete mixture and a slight oversanding when stone-sand is used is also advisable.

"The Advantages of a Uniform Sales Contract" were pointed out by John Rice, Jr. (General Crushed Stone Co., Easton, Pa.). He told briefly of the laxity prevailing among stone producers in their sales contracts which, in many cases, are simply oral contracts. A satisfactory sales contract must afford protection to both buyer and seller, he stated. He then described a sample contract form which he believed to be ideal for general use in the industry, with of course some slight alterations to be made to suit the conditions existing in different localities.

In discussing Mr. Rice's paper, Ellwood Gilbert (New Castle Lime & Stone Co., New Castle, Pa.) stated that this form of sales contract had been adopted by the Pennsylvania Stone Producers' Assn. and that it afforded a common ground on which the producer can meet the buyer. This uniform contract, said Mr. Gilbert, also had a stabilizing effect on sales prices.

This subject was one of vital importance to all those present and an animated discussion arose as to whether or not the association should officially recommend such a form. At the motion of Arthur S. Lane (John S. Lane & Son, Inc., Meriden, Conn.), this matter was referred to a committee on standards by a unanimous vote. The form of uniform sales contract described by Mr. Rice has also been officially adopted by the New York State Crushed Stone Assn.

The subject of "Truck Delivery and Its Responsibilities" was discussed by John B. Lockhart, attorney of New Castle, Pa., who, as legal adviser to producers in that section of the state, was fully competent to speak on this subject. Mr. Lockhart summarized the responsibility of companies using owned or rented motor trucks, both as to public liability and under the state compensation law. He cited numerous court decisions in actual cases to bring out the distinction between the responsibility of the producer when the hauler is acting as a servant of the company and when he is acting as an independent operator.

The discussion of this paper was led by Quincy McBride, representative of the Aetna Insurance Co., New Castle, Pa. He described the various types of insurance necessary to protect both producer and truckman in cases similar to those cited by Mr. Lockhart.

SOME indication of the requirements of airports in the matter of pavements was given by Fred E. Swineford, chief engineer of the Ohio Crushed Stone Assn. He described in considerable detail the nature of the loads sustained by the pavements at airports, comparing, or rather constrasting, these loads with those encountered in highway practice. On airport runways the density of traffic is very limited and the impact of the loads caused by landing are distributed over large areas, as contrasted with highways on which the impacts recur very frequently and are applied at the same point. Runways must be rough enough when wet to prevent skidding in landing, yet smooth enough to allow quick take-off. The minimum runway length is about 2,500 ft., only a small portion of which is actually subjected to traffic loads. Runways are made of bituminous macadam, asphaltic concrete, or Portland-cement concrete, about 91 per cent. of all runways being of the first-named type. The average cost of such a runway is $1.28 per sq. yd.

Dr. Ralph J. Watkins, director of the Bureau of Business Research of the University of Pittsburgh, spoke at considerable length and to a very attentive audience on possible solutions of our economic problems, especially as these are typified now by the present state of business. The title of his paper—

Crusher model shown by Kennedy-Van Saun Mfg. & Eng. Co.

"The Swope and Related Plans for Business Stabilization"—was misleading in the sense that it does not indicate the precise nature of his address, which dealt with the function and importance of economic research as a means of remedying the evils of the present situation and of preventing their recurrence. He mentioned an important truth, but one frequently overlooked, when he said that, although business men want to relieve the existing situation,

they do not know what to do or what it is possible to do within the narrow restrictions imposed by present legislation. He stated also that our economic system is merely a product of evolution and therefore must not be considered as something that can not or should not be changed. In referring to present conditions he said that, in spite of the fact that we have an abundance of material resources and plant equipment, our economic organization is unequal to the task of providing employment or the necessities of life for all our people, and he attributed this situation to two causes: (1) The fact that no one plans for an entire industry, and (2) no one thinks of all industries as a group. Progress has been made in individual business management, but none in general industrial management. In his judgment, unrestricted competition, as an economic system, has failed and it will be necessary to supplant it by industrial self-control. He called attention to the fact that industrial depressions are becoming more severe as the concentration of population in the cities becomes denser, the source of economic wealth being in the soil from which labor is being attracted in increasing degrees to the industrial centers. He remarked that by deferring the purchase of non-essential commodities the consumer can almost wreck industry in times like these.

The fact that business enterprise of every kind touches public welfare at some point is, in his opinion, ample justification for government interference and regulation of business, although he believes that the trade association is the body which should exercise the self-control that is so badly needed. To the attainment of this end he thinks that a greater participation by business executives in the affairs of trade associations is necessary. Our old-time fear of monopoly has been supplanted by our fear of unrestricted competition, which, if uncontrolled, may result in anarchy. An impartial research agency, free from political and business control or influence, is the proper body for correcting present evils, he believes. He contends that no one knows what is necessary to attain stability and that the subject must be approached experimentally. He holds, further, that isolated programs, affecting single industries only, are useless, since the entire economic system must be controlled. Competent specialists are needed and their work must be continuous and unhampered by special interests. Such an organization would continue its study of the general problems and coöperate with trade associations in studying and correcting special and general evils. Economic control, says Dr. Watkins, is our greatest problem.

Some of the legal problems involved in the creation of selling mergers or common selling agencies were discussed by Gilbert H. Montague, New York attorney, and provoked interesting comments and questions. He said that the determining factor in deciding whether a proposed merger is or is not legal is the nature and activities of the factors who are not to be included in it. If the firms not taken into the merged group remain so active that the competitive situation remains general in character, then the merger is, in his judgment, within the law. A common selling agency acting for all the producers in a given area may be illegal. The United States Supreme Court has not said that it would treat sales mergers as it has financial mergers, therefore all such plans as that of the Coal Assn., for example, are likely to be attacked by the Department of Justice because their legality or illegality has not been decided. The Coal Assn. plan provides that each region shall have a single selling corporation, stock in which will be sold to coal producers who will make that corporation their sole selling agency in that territory for a period of ten years. The stock will be controlled by a voting trust composed of some of the corporation's directors. In Mr. Montague's opinion, it is doubtful whether individual companies in other industries would willingly surrender selling control to a selling corporation in which they have but limited voting power. In 1918 Congress made the same plan legal for export business, but there has as yet been no decision regarding its legality in domestic trade.

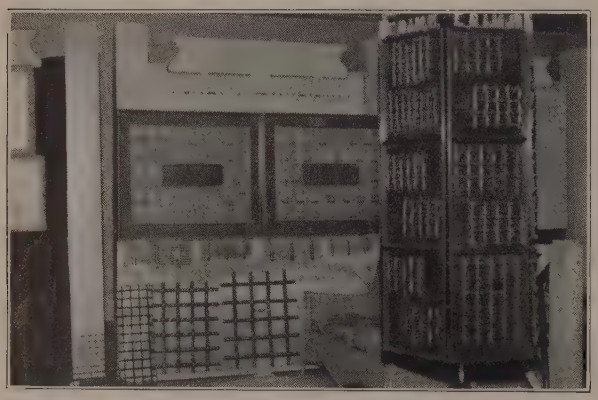
The screen display of the Manganese Steel Forge Co.

If courts and juries should decide that such price discrimination as falls within the meaning of Sec. 2 of the Clayton Act lessens competition, then trade associations can adopt some form of policing prices, such as passing on to their members reports of discriminatory prices at which materials are being sold, and then threatening exposure to the Federal Trade Commission if the damaging methods are not abandoned. In Mr. Montague's opinion, it is permissible to absorb freight-rate differences in quoting prices, if there is no departure from the price-schedules announced to the trade. He holds it illegal to agree to divide business territories, as, for example, when one company agrees to withdraw from a certain selling area in consideration of its competitor's agreeing to make a similar sacrifice with respect to some other area. In the coal field each selling market draws its supplies from several different producing areas, which, in spite of the common selling agency in that market, remain in competition with each other when selling to that market. In considering the legality of proposed sales mergers the determining factor is the market in which the selling is done and not the area in which the goods are produced.

Prices should be controlled, according to Mr.

Montague, if producers were to meet at regular intervals and report their transactions in the past. They could then analyze these and report to other members. They can announce their prices to the trade and their competitors can then see these prices and adopt them. Such action would not constitute an agreement within the meaning of the Clayton Act.

According to Harold Williams, Boston attorney who followed Mr. Montague, the present business situation resulted from an abnormal increase in the potential supply of commodities without a corresponding increase in the natural demand for them. This came about through adoption of the erroneous theory that consumers exist for the benefit of business instead of the true theory that business exists for the benefit of consumers. He said that overselling the public could result in damage not only to the consumers but to the sellers, and that the present situation was made possible because business men know nothing about economics and could not foresee the inevitable results of their methods. In his opinion, stabilization requires three things: (1) Recognition of the fact that supply must be subordinated to demand; (2) the adoption of scientific forecasting of demand; and (3) the regulation of supply to fit that demand. In addition to the natural difficulties that make a realization of such



Sections of screen cloth in the Ludlow-Saylor Wire Co. booth

a program improbable, there are the legal difficulties such as those presented by the anti-trust laws. Every important industry has sought changes in these laws in order to regulate production and prices. As these laws were passed to maintain competition and as price-fixing limits competition, price-regulation is illegal. However, price is made up of many elements and it may be possible to regulate one of these elements, while leaving the others untouched, and so, in effect, regulate prices. Thus, a plan to abide by a fixed rate of profit, arrived at through the adoption of some form of uniform cost-accounting system, would not necessarily be illegal Its purpose, however, must be stabilization and, preferably, it should provide minimum and maximum rates rather than a fixed rate of profit. Excessive profits in the past have, in his opinion, been responsible for undue expansion in the provision of supplies.

A knowledge of unit production costs is essential to stabilization, according to William E. Hilliard of the New Haven Trap Rock Co. His paper, "Why Adopt the Association's Uniform Cost-Accounting System?" emphasized in practical ways the advantages of accurate cost knowledge, especially in a period when prices are falling and profits must come largely, if not entirely, from production economies. The individual factors comprising total cost must be known, as such knowledge will eliminate labor waste and material waste and make possible the intelligent determination of rewards and bonuses for economical working. There should be an exchange of cost data between quarries, and this can be accomplished without disclosing private information by the use of unidentified reports which conceal the operator's name by giving him a code number. He reported that a new bill pending before Congress mentions, as one of the means toward economic stabilization, the adoption of standard cost-accounting systems in various industries.

The Thursday morning session was concluded by the election of officers for the new year. The recommendations of the Nominating Committee were unanimously approved. President A. L. Worthen was reëlected, as were the eight regional vice-presidents: C. M. Doolittle (Canadian), E. Eikel (southwestern), A. S. Lane (eastern), W. R. Sanborn (northern), Russell Rarey (central), T. I. Weston (southern), A. J. Wilson (western), and Porter W. Yett (northwestern).

The old Board of Directors was reëlected except for two members, L. R. Cartwright and W. P. Hodgkins, who had resigned, Mr. Hammerschmidt taking the latter's place. The producer members of the board, therefore, are in addition to Mr. Hammerschmidt: Max A. Altgelt, W. M. Andrews, H. E. Billman, A. J. Blair, L. J. Boxley, C. D. Brewer, O. P. Chamberlain, J. E. Cushing, C. M. Doolittle, F. O. Earnshaw, E. Eikel, Otho M. Graves, F. T. Gucker, J. L. Heimlich, W. E. Hilliard, E. J. Krause, A. S. Lane, Thomas McCroskey, B. A. McKinney, F. R. Patterson, John Prince, Russell Rarey, John Rice, J. A. Rigg, H. E. Rodes, W. R. Sanborn, James Savage, F. W. Schmidt, Jr., J. F. Schroeder, W. L. Sporborg, John W. Stull, Mortimer Wandell, T. I. Weston, G. J. Whelan, A. J. Wilson, W. F. Wise, and Porter W. Yett. Equipment manufacturers' representatives on the new board are Abe Goldberg (Allis-Chalmers Mfg. Co.), Bruce G. Shotton (Hendrick Mfg. Co.), and L. W. Shugg (General Electric Co.).

SOME of the problems to be met in the provision of clean stone were discussed at the afternoon session for operating men, superintendents, and manufacturers. In opening the discussion, A. T. Goldbeck, director of the association's engineering bureau, stated that the purpose of cleaning stone is the removal of material that may impair the usefulness of the mixture in which it may be used. He said that his experience does not agree with that of those who claim that stone dust rises to the surface of pavements made from materials containing it and then scales off under traffic and frost

action. Nevertheless, highway engineers are demanding clean stone. The presence of such dust in ballast is, however, a really objectionable feature, as it makes a dusty roadbed wherever it is used. Sanitary engineers want clean stone for their sewage-treatment plants and in some cases rescreen the stone on its arrival in order to obtain the degree of cleanliness which they require. As a coating on stone used in bituminous construction dust is harmful, for it impairs the adhesive quality of the stone. Even when stone is shipped clean it often accumulates dust in transit and rain may wash this to the bottom of the car or truck, where it gathers and makes the stone so dirty as to warrant rejection of it by the user. Washed stone is easily sold because of its appearance and this is one of its important advantages even when cleanliness may not be a requirement. Another advantage is the possibility of making stone sand as a by-product and so salvaging material that is usually wasted. Among the disadvantages sometimes involved in washing stone Mr. Goldbeck cited the lack of a suitable water-supply in many cases and the trouble often encountered in trying to dispose of the waste-water. Another disadvantage is the extra cost of the washing equipment and of the power required to operate it.

Regardless of its advantages or disadvantages, however, specifications are becoming more insistent upon washing and the requirements must be met. Everywhere the trend is toward the use of cleaner stone, the usual requirement being that not more than 1 per cent. shall be lost by decantation. Although some specifications define the method to be used in cleaning stone, Mr. Goldbeck considers this erroneous, as the specifications should indicate the results desired rather than the method by which these can be attained.

In the discussion which followed, Harry W. Brandon gave a brief description of the washing methods used by his company, C. C. Beam, Inc., Melvin, O. His firm's system, which was fully described and illustrated in PIT AND QUARRY, Dec. 3, 1930, washes the stone in three stages—the last three sets of double-deck vibrating screens preceding storage. Three sprays of 40-lb.-pressure water on each screening unit provide complete cleansing. F. W. Schmidt, Jr. (North Jersey Quarry Co., Morristown, N. J.) told of dry-cleaning his stone by means of a suction fan and air-ducts connected to the principal dust sources, such as the crusher. No water is required and there is no problem of waste-water disposal. E. Lee Heidenreich, Jr. (New York Trap Rock Corp., Newburgh, N. Y.), said that dry-cleaning is satisfactory except on wet days, to which Frederick N. Taff (Buffalo Crushed Stone Co., Buffalo, N. Y.) replied that even on wet days the stone gets hot enough in passing through the various processes to become dry.

W. E. Farrell (Easton Car & Construction Co., Easton, Pa.) did not read his prepared paper, "From Quarry Face to Crusher," but spoke extemporaneously on some of the many phases of quarry loading and transportation with which he is familiar. From hundreds of time studies of quarry operations and other observations made in many kinds of quarries he has concluded that on hauls up to 3,000 ft. in length for the round trip motor trucks are the most economical form of transport and that the average cost of motor-truck haulage in the cases he has studied is 4 c. a ton. He displayed some interesting motion pictures illustrating various types of dippers and shovels in action, digging in different kinds of stone in many different parts of the country.

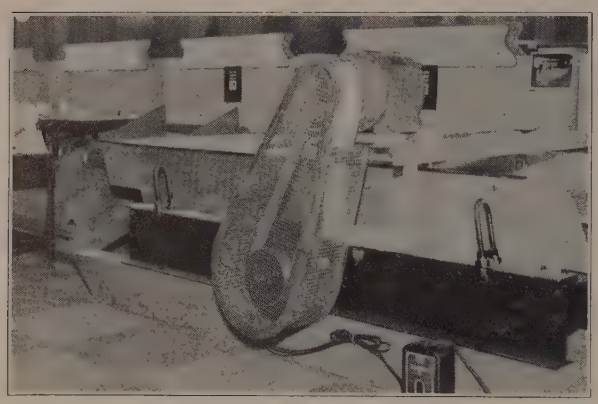
Double-deck screen exhibited by the Simplicity Engineering Co.

THE possibilities of using pre-mixed concrete in municipal work were reviewed by Henry D. Johnson, Jr., construction engineer, division of Bridges and Structures, Dept. of Public Works, Pittsburgh, in the opening address of the closing session Friday morning. He stated that general construction work in 1931 showed a gain over 1930, although private construction had declined. Public construction formed 58 per cent. of all construction work last year, compared with only 40 per cent. in 1925. Of public work completed last year 41 per cent. was done by states, 31 per cent. by municipalities, 19 per cent. by the federal government, 7 per cent. by counties, and only 0.2 per cent. by townships. He estimated that 3½ per cent. of all the concrete used in the country last year was supplied by pre-mixed-concrete producers. The City of Pittsburgh used 18,000 cu. yd. of pre-mixed concrete last year, the length of haul on the various jobs ranging from a few hundred feet to several miles. On one job the saving attained by the use of pre-mixed concrete amounted to 75 c. a cu. yd. In his opinion, producers should use only the most modern equipment and measuring appliances that are accurate within 0.1 per cent. The use of dual pneumatic tires on motor trucks delivering pre-mixed concrete on road jobs has answered the criticism of highway engineers who feared damage to the subgrade. Small portable conveyors, provided with hoppers to receive the concrete from the trucks that deliver it, have proved satisfactory, he said.

J. L. Shiely (J. L. Shiely Co., St. Paul, Minn.), in his paper on "Manufacturing and Selling Ready-Mixed Concrete," said that the materials used must be of high quality, be properly proportioned, and accurately controlled. He warned his hearers against the employment of anything less than the

best engineering talent, men who have had experience with concrete. He recommended that aggregates be received in separate sizes and that these be recombined as required. The producer must have a complete system of mixes. Mr. Shiely's experience has shown that workability and the results of slump tests do not always agree, and that water should never be added to the concrete at the job.

In discussing Mr. Shiely's remarks, J. E. Burke (Ready-Mixed Concrete Co., Pittsburgh) cited



Vibrating screen shown by the Ladel Conveyor & Mfg. Co.

some interesting examples of the difficulties encountered in operating a pre-mixed-concrete business. He said that producers must be provided with the most modern equipment and that they must be able to supply different mixes quickly as required. Thus, in delivering to a tall building, it was found that the elevation of the pre-mixed concrete to the upper floors caused enough pressure on the concrete to drive some of the water to the surface, so that it was necessary to supply a different mix for the higher floors than for the lower.

He referred briefly to the progress made by the pre-mixed-concrete industry, calling attention to the fact that, whereas a few years ago there were but 25 or 30 plants equipped to produce pre-mixed concrete, there are now more than 300 such plants. He also stated that the old problem of segregation in transit had been largely overcome by the use of more modern hauling equipment than the old flat-bottomed truck bodies. The equipment makers, he said, had made possible the highly-uniform product which reliable pre-mixed-concrete producers are able to furnish.

Mr. Burke explained how some contractors, in order to obtain the lowest prices for the pre-mixed concrete they buy, specify the minimum amount of slump and then later demand more workable concrete without being willing to pay for it, although its production cost is greater. He cautioned his listeners against the delays encountered when delivering pre-mixed concrete to contractors' jobs and the great cost that results, unless the contractors are penalized for their failure to unload the producer's trucks promptly.

On one job to which Mr. Burke referred the contractor handled twice as much concrete in an 8-hr. with the same number of men, because he was using pre-mixed concrete. Of some nine or ten producers in Pittsburgh, there are two which, he said, are responsible and qualified to deliver a high-quality product consistently and dependably. The small operator with little to lose and everything to gain destroys business by humoring the contractor's whims, agreeing to provide concrete of any required strength without knowing how to produce it. Mr. Burke's company will meet some of the contractor's special requirements, such as adding water at the job, but requires the contractor to sign a release which relieves the producer of any liability that might arise from furnishing an inferior product. Mr. Burke added that the pre-mixed-concrete industry is not a small man's business.

The pessimism that has contributed so largely to the continuance of unfavorable business conditions was severely condemned by W. B. Burruss, who, in an inspiring talk entitled "Start from Where You Stand," ridiculed the fears of business men and showed them the folly of crying over the past, which he characterized as the one period of history that can not be changed. He cited several interesting examples to show that there is business to be had, if business men will only seek it intelligently and fight hard to get it. The real men, he said, get the business while the others sleep or weep. However, it is no job for a boy, and he told a humorous anecdote to illustrate the point. Two traveling salesmen were anxious to reach a distant railroad station in time to meet a certain train and engaged a Negro to drive them there in his spring wagon. This happened in the year of the last solar eclipse and, in order to speed the man on the journey, they told him of the coming end of the world and that the sun would become dark just before the end. The man drove his old nag as fast as it could run, for he observed the gradual darkening of the sun as the shadow began to pass over it. He was still far from the station when, fearing that he would arrive too late, he suddenly stopped his horse and, jumping from the seat, fell on his knees and clasped the spokes of one of the wheels in his hands. He turned his gaze frantically upward and cried in an anguish that was only too real: "Oh, Lawd, good God, help dis yere sinnin' Nigger. Ah'se done shot craps, Ah'se stole' chickens, Ah'se not been t' chu'ch, and Ah'se been drinkin' gin, but, good Lawd, Ah sho' needs yo' help. Take pity on me, oh, Lawd, come down yere and he'p me out. An' come down yo'se'f. Don' send yo' son, Jesus Christ, 'cause dis ain't no job fo' a boy."

It is true, said Mr. Burruss, that this age has produced no great poet, no great philosopher, no great novelist, no great historian comparable with the great names of history, but it has produced the greatest scientists, it has given us the most comfortable, the most interesting age, of all time, and we have every reason to be contented, courageous, and hopeful. We should discard our alibis, our habit of claiming on someone or something else the cause of troubles that we ourselves bring about. An alibi, he said, is only a justification for defeat.

The last paper of the session was one, entitled "Present Trends in Railroad-Ballast Specifications," in which the author, A. P. Crosley, chair-

man, Committee II—Ballast, American Railway Enginering Assn., and division engineer, Reading Co., Harrisburg, Pa., reviewed the history of ballast specifications and gave some indications of the direction in which present specifications are moving. Mr. Goldbeck then offered some interesting facts and illustrations, showing the results of tests made with various types of ballast material—stone, round gravel, and crushed gravel. His results showed, he said, that angularity is an important factor in stability, and his curves showed the differences between the two kinds of gravel as well as those between gravel and stone. All the materials tested were graded in the same way so as to make the conclusions valid.

After the presentation of brief reports on behalf of the resolutions and auditing committees, the convention closed and the members participated in a farewell lunch prior to the final meeting of the board of directors.

THE entertainment features of this convention deserve all praise. On the evening of the second day the men were guests of the Pennsylvania Stone Producers' Assn. at a stag party which was attended by several hundred persons. The stage program, participated in by more than twenty performers, was presented by a cast brought from New York specially for the purpose. Every one commented on the nature of the program, which was well-balanced and clean. The committee in charge of the arrangements was headed by Otho M. Graves, who was assisted by W. M. Andrews, F. W. Cramer, E. G. Lewis, P. B. Reinhold, and E. T. Wolf.

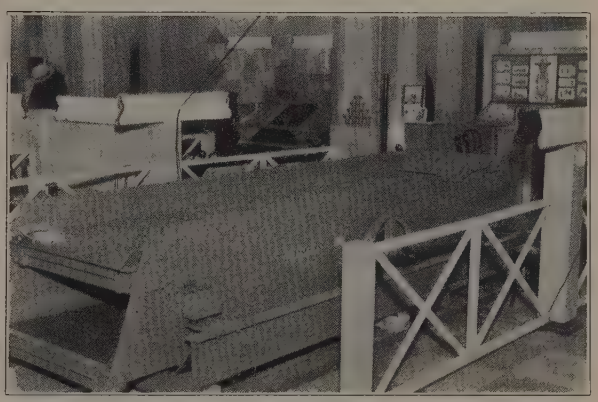
The fifteenth annual banquet, held in the ballroom of the William Penn Hotel, was one of the most successful in the history of the association. Producers, equipment-manufacturers' representatives and guests attended in large numbers and pronounced the food, the service, and the musical features of the program excellent. Paul B. Reinhold (Reinhold & Co., Inc.), to whom much of the credit for making the banquet a success is unquestionably due, proved to be a gifted toastmaster. His sincerity and directness of thought and purpose, so evident to all who know him, characterized his every act and word and were in complete harmony with the serious purpose which was so apparent throughout the convention.

At the conclusion of the dinner Mr. Reinhold introduced Scott Turner, director of the U. S. Bureau of Mines, who presented the award for the National Crushed Stone Assn. safety contest. For the third consecutive time the trophy was won by the quarry of the Marquette Cement Mfg. Co. and it is now the company's permanent possession. A new trophy has been donated by *The Explosives Engineer* for future competitions. The trophy was accepted by E. M. Gould, quarry superintendent of the Marquette company and the man to whom much credit is due for having attained the remarkable record of 3 yr. and 10 mo. operation without a single lost-time accident.

The guest of honor and principal speaker of the evening was the Hon. James M. Beck, United States congressman from Pennsylvania. Talking on his scheduled subject, "Government in Industry," he asserted that our government, founded on the theory of individualism, has become a socialistic bureaucracy in which nothing is left to the individual. Most of the 150 bureaus maintained by the government, he said, attempt to regulate the lives of private citizens from the cradle to the grave and drain the productive wealth of the country.

Following an amusing talk by Douglas Malloch, a poet from Chicago, Mr. Reinhold presented to the General Electric Co. the silver cup awarded for having the most interesting and popular exhibit at the exposition. First honorable mention went to the Niagara Concrete Mixer Co. and the second to the Bucyrus-Erie Co.

Due to the thoughtfulness and untiring zeal of Mrs. F. O. Earnshaw, who was aided by Mrs. Wm. M. Andrews, Mrs. Paul B. Reinhold and Mrs. Bruce G. Shotton, the women guests enjoyed an almost continuous round of pleasant entertainment. They first gathered for a "get-acquainted" tea, at which Mrs. J. A. Rigg and Mrs. Stanley A. Phillips were asked to "pour." On the second day they inspected the J. L. Heinz Co. plant, where they lunched, and



Roller-bearing screen displayed by the Niagara Concrete Mixer Co.

then visited the Carnegie Museum, after which they made a short motor tour of Pittsburgh. Late that afternoon and evening they attended a performance of Eugene O'Neill's *Mourning Becomes Electra,* which was given in two portions separated by dinner. On the following day they made a shopping tour through Kaufman's department store, where they lunched and witnessed a style show.

THE Manufacturers' Division Exposition, which was formally opened on the evening of the first day, was held in Pirate Hall at the William Penn Hotel. The exhibits were varied and interesting and it was generally remarked that the visitors, although perhaps not as numerous as on some former occasions, were more serious-minded and more intent on observing and learning. Their comments were complimentary to the exhibitors and many expressed themselves as feeling well rewarded for their time by the practical knowledge acquired from a tour of the booths and conversations with the

equipment-manufacturers' engineers and other representatives present.

In addition to the usual exhibitors' contest for the most appropriate and interesting exhibit, there was a drawing of lots for five prizes to be awarded to those attending the exposition and visiting all the booths. The winners were: F. J. Long (West Roxbury Trap Rock Co., West Roxbury, Mass.), E. E. Dotter (General Crushed Stone Co., Glen Mills, Pa.), H. W. Craig (John T. Dyer Quarry Co., Birdsboro, Pa.), H. E. Rainer (Federal Crushed Stone Corp., Buffalo, N. Y.), and A. D. Blakeslee (New Haven Trap Rock Co., New Haven, Conn.).

Two guessing contests were added features of the exposition. The Bucyrus-Erie Co. exhibited a huge rock which weighed 5,935 lb. and offered prizes for the guesses nearest its correct weight. S. B. Douglas (Lima Stone Co., Lima, O.) won first prize with a guess of 5,920 lb. The Hercules Powder Co. offered prizes to those guessing most nearly correctly the number of blasting caps contained in a glass jar in the company's booth.

Exhibitors, and a brief résumé of their booths, were as follows:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
A photographic display of the Newhouse crusher and vibrating screens. Also a display of Rollway cylindrical roller bearings and descriptive literature.

American Manganese Steel Co., Chicago Heights, Ill.
A complete line of manganese-steel dipper teeth, chains, sprockets, etc., as well as photographs and descriptive literature.

Crusher and log-washer exhibit in the McLanahan & Stone Corp. booth.

Earle C. Bacon, Inc., New York, N. Y.
A panel showing a typical jaw crusher and a cross-section showing its various features. Also a miniature operating model, photographs and literature.

Bucyrus-Erie Co., South Milwaukee, Wis.
Operating models of a walking dragline and a 120-B shovel, photographs and booklets of the company's entire line. A guessing contest as to the weight of a large rock exhibited in the booth attracted considerable attention.

Burton Explosives, Inc., Cleveland, O.
Descriptive literature, booklets and photographs.

Cross Engineering Co., Carbondale, Pa.
Samples of carbon and manganese-steel perforated screens of all sizes. Also descriptive literature.

E. I. DuPont de Nemours, Inc., Wilmington, Del.
Photographs and literature and copies of *Explosives Service Bulletin* and blasting handbook.

Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, O.
Attractive black and gold curtain display, photographs of various types and sizes of locomotives and descriptive literature.

Flannery Mfg. Co., Pittsburgh, Pa. (Exclusive sales agents for Detachable Bit Corp. of America.)
Exhibited detachable air-drill bits, photographs of bits in use in quarries and descriptive literature.

Frog, Switch & Mfg. Co., Carlisle, Pa.
Exhibited various track accessories and parts and literature.

General Electric Co., Schenectady, N. Y.
Exhibited Thyratron-tube organ, Aten-Quadrillron Fold amplifier, thrustor, photoelectric relay, Thyratron-tube speed trap and a totally-enclosed fan-cooled motor. Literature. This exhibit was very popular and was voted the association's prize of a silver loving cup as the best exhibit.

Hardinge Co., Inc., York, Pa.
Attractive operating model of conical scrubber and screen and a clarifier operating in conjunction with it. Photographs and literature.

Harneschfeger Corp, Milwaukee, Wis.
Moving picture of shovel in operation, photographs and descriptive literature.

Hendrick Mfg. Co., Carbondale, Pa.
Display racks of various sizes and types of perforated metal screens. Descriptive literature.

Hercules Powder Co., Wilmington, Del.
Exhibited jar full of caps and held contest as to number it contained. Cash prizes were awarded to the winners. Also photographs and descriptive literature.

Jaeger Machine Co., Columbus, O.
Photographic panel of truck mixers in operation and descriptive literature.

Kennedy-Van Saun Mfg. & Engr. Co., New York City.
Cross-section panel of gearless gyratory crusher and operating model of crusher. Also photographs and descriptive literature.

Kensington Steel Co., Chicago, Ill.
Photographic display of dipper teeth, elevator buckets, sprockets, chain, hammer-mill parts, etc., and literature.

Koppers Products Co., Pittsburgh, Pa.
Had a miniature circular track, one half coated with non-tar bituminous material, the other half with Tarmac. Electrically-propelled miniature motor cars running on this wet surface demonstrated comparative non-skid qualities. Descriptive literature.

Ladel Conveyor & Mfg. Co., New Philadelphia, O.
Full-size operating units of Summit screens, also conveyor idlers, photographs and literature.

Link-Belt Co., Chicago, Ill.
Photographic display of plants and products, model Shaw classifier, sample conveyor idlers, speed reducer, pan conveyor and full-sized single-deck vibrating screen. Literature.

Ludlow-Saylor Wire Co., St. Louis, Mo.
Wall and revolving stand displays of various types and sizes of wire screen cloth. Descriptive literature.

Manganese Steel Forge Co., Philadelphia, Pa.
Samples of various types and sizes of wire screen cloth, both manganese and new hardened and tempered screen cloth, photographs and literature. Also sample decks of Rol-man rib screen for heavy scalping service and rib screen with removable screen bars which can be replaced when worn out.

McLanahan & Stone Corp., Hollidaysburg, Pa.
Full-sized steel single-roll crusher, operating model of log washer, photographs and literature.

Marion Steam Shovel Co., Marion, O.
Photographic display of shovels in operation and descriptive literature. Also gave out pipes in the form of a shovel dipper as souvenirs.

National Crushed Stone Assn., Washington, D. C.
Booth in prominent location with copies of publications, pamphlets, etc. Someone in constant attendance to give information to visitors.

National Equipment Corp., Milwaukee, Wis.
Photographic display of installations, concrete mixers, mixer trucks, shovels, dippers, etc. Also miniature operating model illustrating mixing action of Smith truck-mixer body. Literature.

National Safety Council, Chicago, Ill.
Attractive display board of safety pamphlets and literature centered about the bronze National Crushed Stone Industrial Trophy.

Niagara Concrete Mixer Co., Buffalo, N. Y.
Large double-deck roller-bearing screen in operation. Photographs showing screens in operation and descriptive literature.

Nordberg Mfg. Co., Milwaukee, Wis.
Cross-sectional operating model of Symons cone crusher illustrating its method of operation and an attractive miniature of a complete crusher in operation. Also a photographic display and literature.

Ohio Power Shovel Co., Lima, O.
Large photographic display of shovel in operation and descriptive literature.

Pit and Quarry Publications, Chicago, Ill.
Copies of Annual Crushed Stone Section, Annual Review and Engineering Number, and Handbook and Directory.

H. K. Porter Co., Pittsburgh, Pa.
Photographic panel of steam, gasoline, gas-electric, oil-electric and fireless steam locomotives and descriptive literature.

Robins Conveying Belt Co., New York City.
Photographic display of new plants built recently, also of apron feeders, vibrating screens, belt conveyors, elevators, roll grizzlies and other equipment. Literature.

Rock Products, Chicago, Ill.
Copies of Annual Review Number, *Concrete Products* and other literature.

Sauerman Bros., Inc., Chicago, Ill.
Operating models of cableway excavator, Crescent scraper operated with hoist and posts and one operated by a crawler crane. Descriptive literature.

Simplicity Engineering Co., Durand, Mich.
New Model B double-deck, heavy-type direct-drive vibrating screen with new resilient rubber mountings and compensator on drive shaft for adjusting to load. Catalogs and photographs of screens and disintegrator.

Stearns Conveyor Co., Cleveland, O.
Photographic display of Rex agitator and mixer trucks and samples of belt conveyor idlers and section of pan conveyor. Descriptive literature.

Stephens-Adamson Mfg. Co., Aurora, Ill.
Attractive colored panel of belt-conveyor and drive and photos of plants, conveyors, feeders, screens, grizzlies, etc. Literature.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Samples of manganese-steel dipper teeth, sheaves, crawler treads, chain, elevator buckets, crusher concaves, and Timang woven-wire screen cloth. Literature.

The Thew Shovel Co., Lorain, O.
Photographic display and literature on complete line of shovels, etc.

Traylor Engr. & Mfg. Co., Allentown, Pa.
Cross-sectional model of gyratory crusher with bell head and concaves and model of crusher shaft. Photographs and literature.

Troco Lubricating Co., Philadelphia, Pa.
Samples of regular and special-waterproof greases and literature.

The W. S. Tyler Co., Cleveland, O.
Panel display of various types and sizes of screen cloth, photographs and literature. Also Ro-tap sieve shaker, Hum-mer vibrating screen, and Ty-Lab tester in operation.

F. M. Welch Engineering Service, Inc., Greenville, O.
Photographic display of Greenville stackers in operation and attractive miniature operating model of Allswede scrubber.

West Process Pavement Co., Louisville, Ky.
Samples, photographs and literature.

Woodford Engineering Co., Chicago, Ill.
Photographs illustrating remote-controlled electric quarry-haulage systems in operation and descriptive literature.

U. S. Bureau of Mines, Washington, D. C.
Photographic display of new apparatus for measuring and precisely recording earth vibrations. Also photographic display of chief causes of fatalities and injuries and informative circulars on various quarry operations.

U. S. Bureau of Public Roads, Washington, D. C.
Models of various types of brick, concrete, bituminous concrete, bituminous macadam, surface-treatment, gravel, stone, and other types of roads so constructed as to show their method of construction. Also model bridges, culverts, grade separations, etc.

Model conical-scrubber on exhibit by the Hardinge Co.

Agstone Producers in Short Session at Pittsburgh Convention

The National Agricultural Limestone Products Assn. opened its program at 1:00 o'clock on Thursday afternoon, January 21, with a luncheon in the Blue Room of the William Penn Hotel, Pittsburgh. F. O. Earnshaw, president of the association, presided at the meeting which followed.

After a few appropriate remarks Mr. Earnshaw introduced Dr. J. W. White, professor of soil technology, in charge of soil research, Pennsylvania State College, who spoke on the development of agricultural lime and limestone products and their value to the farmer. Dr. White traced the use of this material through the ages and cited ancient manuscripts which proved that oyster shell, marl, and stone were used for agricultural purposes long before the Christian era.

In speaking of present conditions in this industry Dr. White recommended a uniform lime law. In comparing the values of high-magnesium and high-calcium limes for agricultural purposes he

stated that both have practically the same value for the correction of soil acidity and for neutralization. He then briefly summarized the service of the bureau in advising farmers and offered the services of the bureau to any producers wishing to avail themselves of it.

Burton A. Ford, sales manager, Valve Bag Co., New York, spoke on "The Trade Association as a Stabilizer." The gist of Mr. Ford's address was that an association backed by an industry can effect great good in price stabilization without resorting to illegal price-fixing. His contention was that producers operating modern plants and using modern methods are entitled to a fair profit on their product in normal times.

Due to the fact that a quorum was not present at this meeting it was decided to postpone the business meeting of the association and the annual election of officers. This business will be taken up at the next meeting of the association which will be held in Columbus, O., early in February, the exact date to be announced later.

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Baugh (Harve L.), Pittsburgh, Pa.
Beal (George D.), Mellon Institute, Pittsburgh, Pa.
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Boyles (R. H.), Universal Atlas Cement Co., Pittsburgh, Pa.
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Challinor (C. G.), Colonial Iron Co., Cleveland, O.
Charles (F. R.), P. & W. V. Ry. Co., Pittsburgh, Pa.
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Clarke (R. W.), White Rock Silica Co., Greenville, Pa.
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Dow (L. M.), Knoxville, Tenn.

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Earnshaw (Mrs. Geo. M.), Rocky River, O.
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Fletcher (R. P.), Interstate Amiesite Co., Wilmington, Del.
Ford (Burton A.), New York, N. Y.
Forman (R. G.), Industrial Silica Corp., Youngstown, O.
Fox (Robert L.), City Engineer, Bethlehem, Pa.
Frey (V. M.), General Explosives Corp., York, Pa.
Fry (J. R.), White Rock Silica Co., Greenville, Pa.
Fugate (H. M., Jr.), Hollywood Beach Hotel & Golf Club, Hollywood, Fla.

Goldbeck (Mrs. A. T.), Washington, D. C.
Griffith (E. A.), Allegheny County, Pittsburgh, Pa.
Groh (F. W.), Allegheny County, Pittsburgh, Pa.
Grove (James H.), M. J. Grove Lime Co., Frederick, Md.

Hale (Chas. C.), Loomis Machine Co., Tiffin, O.
Hall (R. F.), West Baden Springs Hotel, West Baden, Ind.
Harper (Mrs. L. M.), Chicago, Ill.
Hatton (Edith), Master Reporting Co., Chicago, Ill.
Haver (Fritz), Haver & Boecker, Germany.
Heim (Mrs. P. E.), Youngstown, O.
Henderson (Miss Josephine), Pittsburgh, Pa.
Holton (G. C.), General Explosives Corp., Latrobe, Pa.
Howell (S. P.), U. S. Bureau of Mines, Pittsburgh, Pa.
Hulbert (Dr. H. S.), Chicago, Ill.

Jackson (Mrs. Joseph H.), Youngstown, O.
Johnson (Henry D., Jr.), Div. of Bridges and Structures, Pittsburgh, Pa.
Johnston (Mrs. Harry A.), Lebanon, O.
Joyce (Dr. W.), U. S. Bureau of Mines, Pittsburgh, Pa.

Killen (Chas.), Lima Stone Co., Lima, O.

Lamson (Dan R.), American Road Builders' Assn., Washington, D. C.
Lane (Mrs. Arthur S.), Meriden, Conn.
Lee (F. W.), U. S. Bureau of Mines, Washington, D. C.
Lewis (J. Volney), Chicago World's Fair, Chicago, Ill.
Lockhart (John P.), New Castle, Pa.
Lopatin (N.), New York, N. Y.
Lowry (Wm. F.), American Car & Foundry Co., Pittsburgh, Pa.
Lowry (Mrs. William F.), Pittsburgh, Pa.
Lynn (Floy), Master Reporting Co., Chicago, Ill.

Macdonald (John A.), State of Connecticut, Conn.
Macdonald (Mrs. John A.), Hartford, Conn.
Malloch (Douglas), Chicago, Ill.
Mattimore (H. F.), Department of Highways, Harrisburg, Pa.
McBride (Quincy A.), Aetna Insurance Co., New Castle, Pa.
McCullough (F. M.), Carnegie Institute of Technology, Pittsburgh, Pa.
McNally (T. H. R.), Toronto, Canada.
McThenia (Mrs. A. W.), Alderson, W. Va.
Miller (A. M.), State Road Commission, Morgantown, W. Va.
Monk (Wm. R.), Pittsburgh, Pa.
Montague (Gilbert H.), New York, N. Y.
Moulton (W. T., Jr.), Boscobel Granite Quarries, Inc., Richmond, Va.
Munsch (A. A.), U. S. Bureau of Mines, Pittsburgh, Pa.
Murray (Henry H.), Bureau of Tests, Pittsburgh, Pa.

Noble (J. F.), Blairsville Bluestone Co., Blairsville, Pa.
Noll (Mrs. Ray C.), Bellefonte, Pa.
Norton (J. R.), Smith Engineering Works, New York, N. Y.

Papworth (R. S.), Austin Powder Co., Cleveland, O.
Phillips (Mrs. Stanley A.), Chicago, Ill.

Quigley (T. J.), Department Labor & Industry, Bloomsburg, Pa.

Reading (Robert), Poland, O.
Reading (Mrs. Robert), Poland, O.
Reinhold (Mrs. Paul B.), Pittsburgh, Pa.
Reynolds (Charles V.), Reynolds Bros., Inc., Boston, Mass.
Rhoades (F. M.), Sherman & Rhoades, Lewiston, Pa.
Rhoades (Max), Lewiston, Pa.
Richmond (T. L., Jr.), Buffalo Scale Co., Pittsburgh, Pa.
Rigg (Mrs. J. A.), Alderson, W. Va.
Rivera (R. Jose), Dept. of the Federal District, Mexico City.
Roberts (Chas. R.), Yoch & Roberts, Norristown, Pa.
Rogers (E. J.), Bureau of Mines, Pittsburgh, Pa.
Rush (G. P.), Geo. P. Rush & Co., Pittsburgh, Pa.
Ryan (James A.), Ryan Quarries, Inc., Albion, N. Y.
Ryan (Stephen J.), Quarrymen's Supplies Co., Norristown, Pa.

Sanders (Harriet), Pittsburgh, Pa.
Sanders (Katherine), Pittsburgh, Pa.
Schuman (E. M.), General Explosives Corp., Latrobe, Pa.
Schuette (R. W.), Messinger Bearings, Inc., Pittsburgh, Pa.
Scott (Jack V.), National Safety Council, Chicago, Ill.
Scott (Mrs. J. V.), Chicago, Ill.
Shepherd (Mrs. R. C.), Hillsville, Pa.
Shiely (J. L.), J. L. Shiely Co., St. Paul, Minn.
Smillie (Sheldon), Tyson Roller Bearing Corp., Pittsburgh, Pa.
Smith (I. M.), Smith Steel Supply Co., Pittsburgh, Pa.
Sparks (Mrs. W. C.), Princeton, Ky.
Sporborg (Mrs. W. L.), Syracuse, N. Y.

Thomson (J. H.), General Materials Co., St. Louis, Mo.
Thompson (James Robert), Frankfort, Ky.
Thompson (Mrs. James R.), Frankfort, Ky.
Titzel (John M.), Smith Engineering Works, Pittsburgh, Pa.
Tolch (N. A.), U. S. Bureau of Mines, Pittsburgh, Pa.
Turner (Scott), U. S. Bureau of Mines, Washington, D. C.

Upham (Chas. M.), American Road Builders' Assn., Washington, D. C.

Walker (J. G.), Walker Bros., Ltd. Thorold, Ont., Canada.
Watkins (Ralph J.), Bureau of Business Research, University of Pittsburgh, Pittsburgh, Pa.
Webster (E. K.), Pekin Stone Products Corp., Lockport, N. Y.
Wilson (Geo. P., Jr.), Philadelphia Coke Co., Philadelphia, Pa.
Wilson (J. Walker), Keystone Driller Co., Youngstown, O.
Wilson (W. A.), Gillette Publishing Co., Pittsburgh, Pa.
Williams (Harold), Boston, Mass.
Withum (A. L.), Bureau of Tests, Pittsburgh, Pa.
Worthington (Arthur W.), Pittsburgh Limestone Co., Pittsburgh, Pa.
Wright (Charles Will), Bureau of Mines, Washington, D. C.

Young (John H.), Timken Roller Bearing Co., Pittsburgh, Pa.

One Out of Every 369 Persons Employed on State Road Work Last Year

By W. C. MARKHAM
Executive Secretary, American Assn. of State Highway Officials

WE have always been taught to measure road improvements by the yard. In 1931 we were asked to reckon them by heart beats. It seems but yesterday when state highway departments feared to let it be known how many people got their bread and butter from jobs on the state highways. Now they are importuned on every hand to hire more men.

The Federal government is capitalizing the information as to how many people have a livelihood because of increased Federal appropriations for highways and the states have—many of them for the first time—found that not only the state departments but the contractors have a great army of workers on the roads whose pay envelopes were a vital matter to many a household.

On the first day of July there was one person employed on state-highway work for every 369 people in the nation. The largest number employed in any state at that time was one out of every 70 persons in the state of Maine. This has no reckoning of persons employed in road work by townships, counties, or cities, neither does it have anything to do with persons who are employed exclusively in preparing materials to be used in road construction. Likewise this has no reference to people employed by the Federal government in road work; whether departmental, in forest, Indian reservations, public domains, or national parks.

In addition to this, the fact should not be overlooked that there are many industries scattered throughout the country which would have been closed down had it not been for the demands made upon them to furnish materials for this road-building program.

There have been a number of newspaper stories emanating from several sources as to the highway contracts let by the state highway departments during 1930 and making estimates as to the contracts for 1931. In making this comparison instead of using the actual accomplishments of 1930 they used estimates previously made for the year 1930. This was not at all necessary as the facts concerning the road work for 1930 have been available for several months.

In making a comparison between these two years, in order to see whether the states are lagging in their work, I have made a study of the first six months of these two years. This is done first because we have all of the facts concerning this period of time and second because due to the Federal loan, the contracts for 1931 are without question centralized in this six months period. A comparison of the contracts let during these two periods shows that almost $115,000,000 more contracts were let in the first six months of last year than in 1930; and all of this despite the fact that it came at a time when 42 legislatures were in session and many efforts were made, and some definite changes accomplished, in taking from the state-highway funds motor and gas receipts for local roads and cities.

Nevertheless, while we all rejoice in the policy adopted by the Federal government in making an advanced loan to the states of $80,000,000 which could be used as state funds to match the regular Federal funds, it will be a matter of great surprise to those who have been peddling the story that the states have been slow, when they are made to realize that 23 states increased the contracts during this period to an amount of over $64,250,000 above their allotment of the special emergency loan from the Federal government.

During the past calendar year the states have increased their surfaced mileage on the state systems by almost 26,000 mi. but while they were doing that the legislatures added almost 6,400 more miles to the systems and this has nothing to do with the wholesale job accomplished in North Carolina or the new-idea township undertaking in the placid home of William Penn.

In adding to the surfaced mileage during the past year the types of roads were as follows: gravel 5,014, bituminous macadam 1,076, bituminous concrete 1,065, concrete 9,462, and all other types, 9,380. We started this year with a state system of 321,723 miles; 29 per cent. in pavement, a gain of 3 per cent. over last year; gravel 31 per cent., a gain of 2 per cent. over last year; sand-clay and other types 12 per cent., a gain of 3 per cent. over last year. This leaves 28 per cent. still earth roads, or a net gain in surfaced mileage of but 8 per cent. However, this remaining 28 per cent. of earth roads is 38 per cent. graded to standard and supplied with proper small drainage structures.

Our association has taken the position, as a financial policy in road building, that there comes a time in road improvements when a state should be obligated to assist the counties in maintaining a definite county system of highways, definitely coordinated with each other and with the state system. The percentages of improvement of the state systems doubtless should be the basis of such procedure. What that percentage should be is a matter for local decision. However, the impatience to get a larger system of improved highways seems to have overcome the local political powers and in some instances the state authorities have been loaded up with local mileages without a full knowl-

edge of the finances needed or the condition of the state system.

The percentage of surfacing in the several states ranges from 26 to 100 per cent. but the state which has but 26 per cent. of its state system with any kind of surfacing has a responsibility of maintaining, as a state system, 21 per cent. of the entire road mileage. Under normal conditions this state would have its state system 54 per cent. surfaced. It would seem, therefore, that this state is in no position to aid the counties and yet it does.

There are 28 states which claim that over 70 per cent. of the state system is surfaced. Of these states 23 are now giving aid to the counties. There are 14 states whose state systems are less than 70 per cent. surfaced—from sand-clay up—and yet they divide some of the state funds with the counties.

The total income for state highway department activities for the last calendar year was $1,136,673,437. This is the largest income in the history of road building and does not include cash balances of $286,490,000 distributed among all of the states except one. The receipts came from the following sources: 25.9 per cent. from motor license fees, 36 per cent. from gasoline taxes, 19.5 per cent. from bonds, 5.3 per cent. from local authorities, 0.9 per cent. from state tax levies, 2.8 per cent. from direct appropriations, 1.6 per cent. miscellaneous and Federal funds 8 per cent. The substantial increase of funds over the previous year came from all sources and, therefore, while the Federal funds increased from $77,572,691 to $96,462,836 the percentage of Federal funds to the total was slightly less than in 1929.

The total expenditures through the state-highway departments was $979,997,847, being an increase over 1929 of over $180,000,000. Of these expenditures construction took 62 per cent.; maintenance, 16.8 per cent.; interest on bonds, 4.4 per cent.; retirement of bonds, 6.1 per cent.; transfer to local roads, 5.8 per cent.; equipment, 2 per cent. and miscellaneous 2.3 per cent. While the expenditures for construction average about four times as much as that for maintenance, two states last year spent more for maintenance than for construction. When the year was closed, despite the increased payments made, there were almost $284,000,000 left in the treasuries of the states. However, in four states the funds were entirely exhausted.

For the fiscal year of 1930-31, which is a six-months' advance over the comparison made previously in this statement, the Federal funds in cash payments to the states were a total of $133,340,911. The next largest payment heretofore was made eight years ago and then it was $35,000,000 less than this year. Compared to their share of the regular Federal authorization of $125,000,000 there were 33 states which received cash in excess of this allotment.

The Federal funds obligated during this same period shows a wonderful record due to the use of the Federal emergency loan as state funds. The obligations were $36,000,000 in excess of a regular $125,000,000 authorization, being $157,952,903. Yet it should be noted that there were 12 states which even then did not enter into project agreements for an amount equal to their share of the regular authorization.

It is fair to presume that the Federal funds not under contract on August 1 (the latest date we have found practical to use) which amounts to a little over $30,500,000, were entirely absorbed before Congress opened last month. Fourteen states exhausted their allotments before then. It is well known that there is still one more Federal authorization to be made, but the law passed granting the emergency loan provides that one-fifth of the allotment shall be deducted each year, beginning with next year and until the $80,000,000 has been returned to the Federal government. This will leave, therefore, really but $105,807,000 to be allotted to the states. This situation makes it clearly evident that if the Federal government does not wish to retard its road program, proper provision will need to be made at once.

Much is being said these days about the need of road improvements outside the state systems, some say too much money is spent on the state roads and that the fellow outside is being allowed to flounder in the mud; also, that one reason why the counties and township roads are not comparable to the state roads, is inefficiency and lack of road knowledge. And then the cities complain because they contribute enormous sums through license fees and gasoline taxes and are not given some of the funds to use on their city streets as they may desire.

All of this has led us to prepare a series of maps showing the present coöperation or assistance given roads in the several states outside the state systems.

There are seven states which control in whole or part the county-road systems. There are 36 states which aid the counties with or without supervision of expenditures. There are 14 states which aid the townships with or without supervision of expenditures. There are 21 states which aid the cities of certain population or on certain streets. There are 7 states in which counties may or do control road work in the townships or "towns" and there are 26 states in which the counties are the smallest unit for road responsibility.

A good road is needed over which to transport a load of wheat or cotton or cattle. The price the merchandise brings is not a measure of the need for the highway. The past year's experience shows that an increased road program not only takes the depression out of the highway but it is the base course for many a hearthstone. Every part of our governmental structure has its share of responsibility in meeting the issue. The state-highway departments are equipped for an increased task. Those responsible for legislation must either furnish funds for food or work.

New crushed-stone plant of Geo. M. Brewster & Son, Inc., at North Bergen, N. J. Dry-batching plant at left.

New Jersey Crushed-Stone Plant Rebuilt to Provide Increased Capacity

Reconstruction Work Entirely Completed During Usual Period of Winter Idleness

ONE of the outstanding plant developments of the past year in the crushed-stone industry was the reconstruction by Geo. M. Brewster & Son, Inc., of the firm's plant at North Bergen, N. J. This was done on such an extensive scale that the result is a practically new plant with a capacity of 250 tons per hr. The greater part of the old plant was torn down, the primary crusher relocated and a secondary crusher and a recrusher added. New primary and secondary crushing and screening buildings were erected and the old rotary screens replaced with vibrating screens. The old concrete storage-bins were retained and added to the present screening building.

All this work was done during the winter when the plant is usually shut down, and the plant resumed operation early in April, 1931. Shipments are made by rail, but the bulk of the stone produced is sent by truck direct to jobs or to the company's yard at Bogota for distribution and for the manufacture of concrete, etc. The Bogota yard is one of the largest and most complete in this country and, together with the plant, enables the company to offer a complete supply of construction materials. The plant is located about 6 mi. northwest of Jersey City and 8 mi. south of Bogota on one of the main highways.

The history of Geo. M. Brewster & Son, Inc., in

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF GEO. M. BREWSTER & SON, INC., NORTH BERGEN, N. J.

Operation	Equipment	Make	Model No., Size, Capacity, or Type	Power Source	Power Transmission
Primary crushing	Primary crusher	Farrel-Bacon	42-in. by 60-in. jaw	200-hp. General Electric	Texrope
	Conveyor No. 1	Robins	36-in. by 150-ft.	30-hp. Allis-Chalmers	Texrope and gear
Scalping and secondary crushing	Screen No. 1	Robins Gyrex	5-ft. by 10-ft.	7½-hp. Allis-Chalmers	Texrope
	Secondary crusher	Symons	5½-ft. cone	150-hp. General Electric	Texrope
	Conveyor No. 2	Robins	30-in. by 85-ft.	15-hp. Allis-Chalmers	Texrope and gear
Screening and recrushing	Screen No. 2	Robins Gyrex	4-ft. by 10-ft.		Texrope
	Screen No. 3	Robins Gyrex	4-ft. by 10-ft.		Texrope
	Conveyor No. 3	Robins	24-in. by 80-ft.	15-hp. Allis-Chalmers	Texrope and gear
	Recrusher	Allis-Chalmers	Newhouse Type B	Direct-connected motor	
	Screen No. 4	Robins Gyrex	4-ft. by 10-ft.		Texrope
	Screen No. 5	Robins Gyrex	4-ft. by 10-ft.		Texrope
	Conveyor No. 4	Robins	20-in. by 30-ft.	3-hp. Allis-Chalmers	Texrope and gear
	Conveyor No. 5	Robins	20-in. by 30-ft.	3-hp. Allis-Chalmers	Texrope and gear
	Screen No. 6	Robins Gyrex	4-ft. by 10-ft.		Texrope
	Screen No. 7	Robins Gyrex	4-ft. by 10-ft.		Texrope
Storage	7 concrete bins		1,150 tons		
Batching	Conveyor No. 6	Barber-Greene	24-in. by 105-ft.	15-hp. General Electric	Flat belt
	Conveyor No. 7	Barber-Greene	24-in. by 235-ft.	30-hp. General Electric	Texrope and gear
	Weighbatcher	Blaw-Knox	Fairbanks scale		
Miscellaneous	Air compressors (2)	Ingersoll-Rand	Type XRB	110-hp. General Electric synchronous	

The plant as viewed from the main-line tracks of the railroad.

the crushed-stone industry is an interesting one. The company, originally in the contracting business, was for many years interested in the old Belmont-Burnee Stone Co., which was at that time one of the important producers in the East. The Brewster interests later bought out this company which then had five plants at Suffern, Mt. Ivy, Alpine and North Bergen, N. J., and West Nyack, N. Y. These were all sold except the one at North Bergen, with which this article is concerned. The West Nyack plant was purchased by William Dahm, formerly of the Belmont-Gurnee Stone Co., and is now being rebuilt and enlarged and will begin operation in the spring.

The deposit at North Bergen consists of a close-grained, hard bluestone or trap rock, which is the chief source of crushed-stone supply in the state. This stone is practically limited to the Triassic belt which crosses the state in a northeast-southwest direction from Trenton and Frenchtown on the west to New Brunswick and the Hudson River on the east. This particular deposit is a mound-shaped outcrop considerably to the east of the main deposits of this stone, giving the company a distinct advantage in the economical distribution of stone to the thickly-settled district lining the New Jersey side of Hudson River opposite the city of New York.

The overburden averages 3 ft. in depth and is removed by a gasoline-engine shovel and trucks. Some is sold for fill and the balance dumped to waste-piles. Drilling is done with Sanderson-Cyclone electric well-drills using 8-in. bits. Single-hole shots are made using du Pont 60 per cent. gelatin dynamite and Cordeau-Bickford safety fuse. The small amount of secondary drilling necessary is done with jackhammers. The stone is extremely hard to drill and the well-drills average only 5 to 6 ft. per day. This is compensated for to some extent by the fact that the stone is brittle and crushes easily.

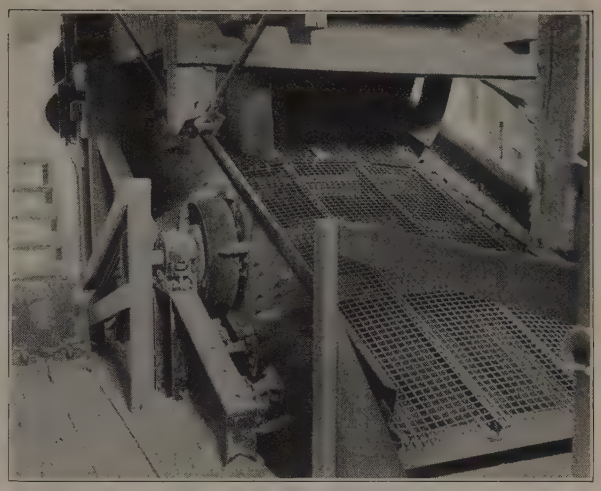
A Northwest No. 4 gasoline-engine crawler crane breaks down the bank for the shovels with a 6,700-lb. steel ball. Stone is loaded into the trucks by a Marion Type 490 electric crawler shovel with a 2¼-

One of the large electric shovels loading a truck in the quarry.

cu.yd. dipper. A second electric shovel of the same size and type is used when the plant is operating at full capacity. The quarry face varies from 40 to 100 ft. in height. The section now being worked has a 42-ft. face and is about 600 ft. from the crusher building. The quarry floor follows the line separating the trap rock from the deposit of white dolomite lying below it. Because of the mound-shaped formation, this results in a quarry floor almost level in the northeast corner of the quarry

General view of the quarry showing the steeply-inclined floor.

Dust screen with belt conveyor feed from coarse screens.



One of the second pair of double-deck vibrating screens.

and pitching with increasing sharpness downward to the west and south. This is actually an advantage because it makes the quarry entirely self-draining. It also facilitates truck movements as the loaded trucks go downhill to the crushing plant and upgrade when returning empty to the quarry. The quarry floor is kept smooth with excess screenings. Rain and traffic pack this down to a smooth hard surface comparable to concrete paving.

The rock is hauled from the quarry to the plant

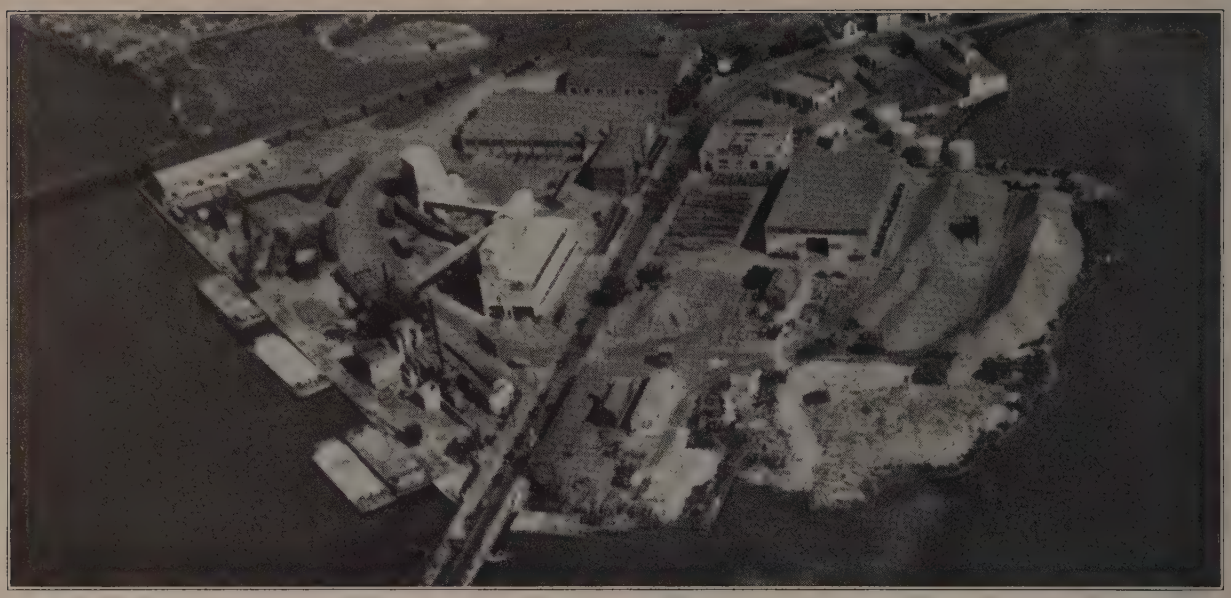
Gasoline-operated crane breaking down quarry face with a steel ball.

by two Mack trucks which have 7½-cu.yd. Easton Phoenix bodies. A third Mack truck used in the quarry during busy seasons has an Easton rear-dump body. At the primary-crushing building the trucks are dumped by an Ingersoll-Rand 10,000-lb. air-hoist suspended from a Reading 20-ton overhead crane into the Farrel-Bacon 42-in. by 60-in. jaw primary crusher. This is driven by a 200-hp. General Electric motor through a Texrope drive and is set at 5-in. opening. Another air-hoist of the same make and size, suspended from a Newhall Corp. 10-ton overhead crane, handles any large pieces of rock that may become lodged in the crusher. The crusher-house has timber framework and Ryerson corrugated-metal siding and roofing.

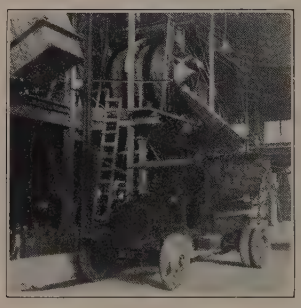
The primary crusher discharges to inclined belt-conveyor No. 1 leading to the secondary-crushing building. This conveyor discharges on a Robins 5-ft. by 10-ft. single-deck vibrating screen with 1¼-in. Rol-man manganese screen-cloth. The "oversize" goes to the Symons 5½-ft. cone secondary crusher which is set at ¾-in. opening. "Throughs" from both the screen and the cone crusher are fed to inclined conveyor No. 2 leading to the top of the screening plant.

Conveyor No. 2 discharges through a split chute to the first pair of sizing screens, which are Robins Gyrex 4-ft. by 10-ft. double-deck vibrators with 1⅞-in. Rol-man manganese wire-cloth on their top decks. The bottom decks of these screens are used only when 2½-in. stone is being made, which is not the case at present. The "oversize" from this pair of screens is chuted to a hopper feeding inclined return conveyor No. 3. This carries the stone back to the scalping and secondary-crushing building where it is fed to the Allis-Chalmers Newhouse Type B gyratory recrusher. This crusher is set at ¾-in. opening and discharges to belt-conveyor No. 2 which carries the material back to the screening building. The reason for setting the two smaller crushers so fine is that the state of New Jersey requires that 20 to 40 per cent. of the ¾-in. concrete stone, which

Stock-pile loader and truck in the quarry.

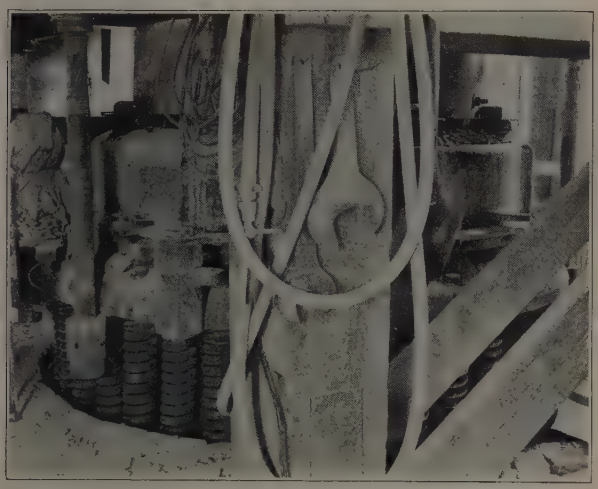


Above—An airplane view of the Bogota, N. J., yard of Geo. M. Brewster & Son, Inc. All the pictures on this page are scenes taken in this yard. *Left*—Truck discharging on ramp to stone-washing building. *Lower left*—Aggregates-storage building with conveyor gallery leading to central-mixing and batching plant at left. One of the trucks may be seen unloading a load of stone. *Below, left*—One of the 3-cu. yd. mixers discharging a batch of concrete to an agitator truck. *Below, right*—A view of the central-mixing and batching plant. *Bottom, right*—The stone-washing unit on the dock.



is at present the chief product of the plant, must pass a ½-in. ring.

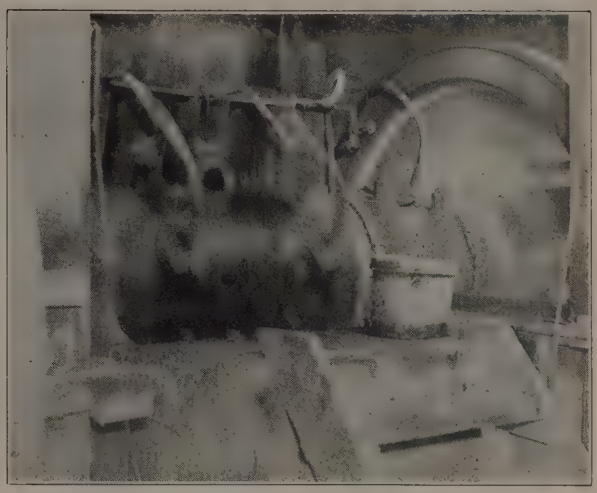
The stone passing through the first pair of screens goes to a second pair, also Robins Gyrex 4-ft. by 10-ft. double-deck vibrators. These also have Rol-man manganese screen-cloth with 1-in. openings on the top deck and ¼-in. openings on the bottom deck. The "oversize" from these screens goes to bin storage as 1½-in. stone. This can be loaded out from the bin or fed by gravity to conveyor No. 3 for recrushing if desired. The stone retained on the lower deck goes to storage as ¾-in. or concrete stone. The stone passing through the bottom deck is fed by short inclined conveyors (Nos. 4 and 5) to a third pair of vibrating screens. These are also Robins Gyrex 4-ft. by 10-ft. double-deck vibrators. Only one deck, with 6-mesh screen-cloth, is being used at present. The oversize material goes to a bin as top-dressing, while that passing through this deck is stored as asphalt dust.



Cone crusher used for secondary reduction.

The screening building is of timber-frame construction inclosed with Ryerson corrugated-metal and is mounted on the top of a 7-compartment concrete bin. Four of these compartments were part of the original plant and the other three were added when the plant was rebuilt. The 2½-in.-material bin holds 212 cu.yd., each of the two ¾-in.-material bins 225 cu.yd., each of the two 1½-in.-material bins 340 cu.yd., and the ⅜-in.-material and screenings bins 190 cu.yd. each. One of the 1½-in.-material bins is in the old section and the other in the new. The new bin was intended for ⅝-in. stone which is not now being produced. Holes cut through the wall separating the two compartments allow the stone to be fed from one bin to the other. The bins can load to trucks in one of the two tunnels below or to cars on a siding alongside them.

Gates in the second tunnel under the bins feed to horizontal conveyor No. 6, which discharges to inclined conveyor No. 7 leading to the truck batching building. This is an all-steel structure on concrete foundations and consists of a 300-ton Blaw-Knox steel bin. Below the bin is a Blaw-Knox weighing batcher which is equipped with a Fairbanks scale

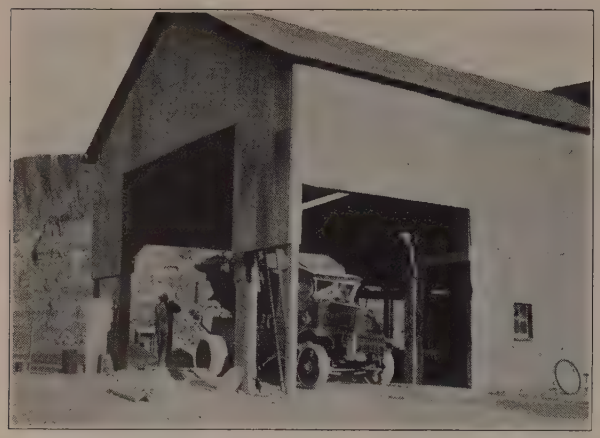


Operating view of the primary jaw crusher.

and discharges to an elongated steel hopper, that discharges through special Blaw-Knox clam-shell gates into batcher trucks. Ample head-room has been left under the bins so that a concrete mixer can readily be installed should the company ever decide to go into the central-mixing of concrete at this location. This unit was erected as part of the old plant and had been in operation over a year before the plant was rebuilt. Steel stairways give access to all parts of this unit. A concrete-and-steel warehouse alongside is used for cement shipments and for loading sacked cement in the dry-batch trucks.

A new blacksmith shop near the plant has a drill-press, grinding wheels, two oil forges and other equipment for making almost any necessary repairs. The old blacksmith shop is used for storing quarry equipment and two Ingersoll-Rand Type XRB air-compressors which furnish air for quarry drilling. These are driven by 110-hp. General Electric synchronous motors and are fitted with air-filters on their intakes. Another building houses the plant office, another shop, a garage for the company's trucks, and a wash-room for the employees.

Discharge from recrusher to the No. 2 belt conveyor.



Truckload of stone being dumped to crusher by overhead hoist.

In anticipation of closing the plant during the most severe winter months stock-piles of all sizes of stone were built up to supply demands during this period. It is estimated that 100,000 tons is now stored in this manner. These stock-piles were built by dumping stone from trucks over cliffs near the plant and then backing the trucks out on the piles as they became larger. Four Barber-Greene stock-pile loaders are used for reloading trucks from these piles. Sand sent in by truck is stored in stock-piles and is reloaded into trucks when there is a demand for it.

The design and reconstruction of the plant were done by the Burrell Engineering & Construction Co. All vibrating screens and conveyors were furnished by the Robins Conveying Belt Co., with the exception of the two conveyors to the batching plant which were supplied by the Barber-Greene Co. The batching plant was furnished by the Blaw-Knox Co. With a few exceptions all machinery is driven through Allis-Chalmers Texrope drives. Rol-man manganese screen-cloth is used on all the vibrating screens.

The Bogota Yards

Geo. M. Brewster & Son, Inc., operate a large and complete material and supply yard at Bogota, N. J.

V-belt and gear drive on the No. 3 belt conveyor.

Located here are a large central-mixing plant, a stone-washing plant, several large warehouses for storing cement, etc., a large garage for the company's trucks, a machine and repair shop, a filling station, and one of the largest and most complete hot- or cold-mix asphalt plants in the country. The company's main office, a large two-story brick building, stands alongside the garage. The garage and machine shop are also built of brick, the filling station is stuccoed, and all the other buildings are of concrete-and-steel construction. The entire yard presents an attractive appearance and each separate plant can be operated independently and efficiently.

The yard lies less than ¼ mi. from down-town Bogota on a main highway which leads east and bisects it. It is also on Hackensack River and has rail connection with the New York, Susquehanna & Western Ry. Sand and gravel are received in barges at the 850-ft. dock on the river front and are unloaded by locomotive cranes to stock-piles or to plant feed-hoppers. Stone is received by truck from the

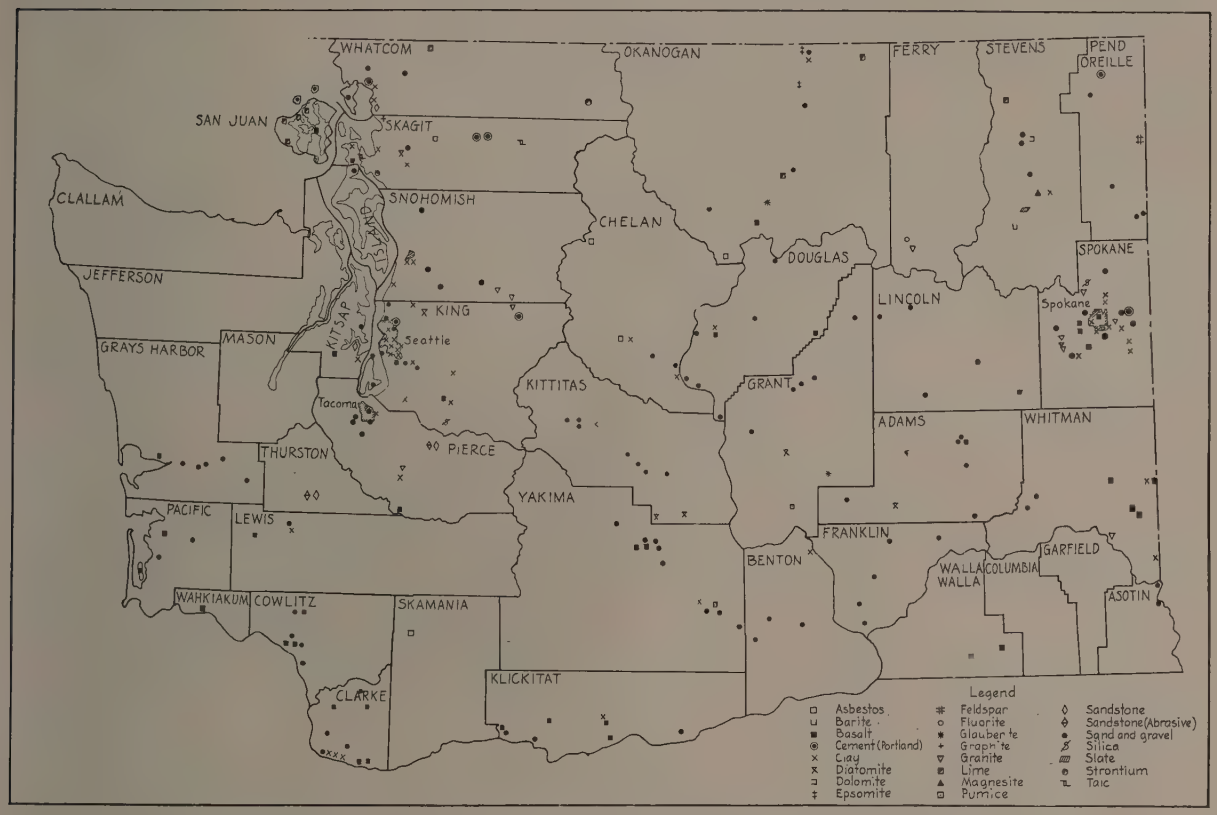
Batched aggregate being loaded to truck.

plant at North Bergen. There is ample stock-pile storage space for sand, gravel and stone and track storage for at least 75 cars. The company also operates 26 shovels and 140 Mack and Pierce-Arrow trucks on contracting work.

The stone-washing plant went into operation at the same time as the crushed-stone plant and has a capacity of about 100 cu.yd. per hr. Trucks loaded with stone are backed up a concrete ramp and their contents are discharged into a hopper. A pan-feeder discharges to an inclined belt-conveyor leading to a triple-jacketed revolving scrubber-screen, which produces 1½-in., 2½-in., and ¾-in. material and discharges to bins. These can feed into trucks or to a short horizontal belt-conveyor that feeds a bucket-elevator discharging to a Barber-Greene stock-piling conveyor. The dirty water drains to a concrete settling tank before being discharged into the river. A locomotive crane cleans out this tank whenever necessary. This plant was designed by the Hansklar Engineering Co. and most of the equipment was furnished by the Link-Belt Co. The

(*Continued on page 52*)

Geology, Development of Washington's Nonmetallic-Mineral Resources



Outline map of Washington showing locations of principal nonmetallic-mineral operations.

Total Value of Production in Far Northwest State Exceeds Ten Million Dollars Annually

THE value of the nonmetallic minerals produced in Washington, exclusive of manufactured clay products and coal, is in excess of ten million dollars annually. Of this amount the cement industry accounts for half and the larger proportion of the rest is to be credited to sand and gravel and stone. Approximately one million dollars annually represents the value of magnesite, lime, and clay. For the past few years the production of abrasives and silica has been recorded also. Nonmetallic minerals presumably present in commercial quantities within the state but the production of which has not been regularly reported are asbestos, barite, dolomite, feldspar, fluorspar, graphite, magnesium sulphate, slate, sodium sulphate, strontium and talc. For convenience in reference these nonmetallic resources are discussed in alphabetical order.

Abrasives

The abrasive materials which have been produced in the state are diatomite, pumice and sandstone, the latter being manufactured into grindstones, pulpstones and millstones.

Diatomite.—Commercial production of diatomite has been made from Adams, Grant, Kittitas and Yakima Counties, and deposits of unestimated value have been reported from Skagit and King Counties. Those deposits in the first group of counties lie within the Columbia Basalt Plateau and in general are found as lenticular beds, intercalated with flows of basalt.

The Kittitas, better known as the Squaw Creek deposits, are 11 mi. southeast of the station of Wymer on the Northern Pacific Railroad and 18 mi. from the town of Kittitas on the Chicago, Milwaukee, St. Paul & Pacific Railroad. At least three beds have been opened in the district, showing an area of several square miles to be underlain by diatomite, which is at least 12 ft. in its maximum thickness. The ancient lake bed in which the diatomite accumulated has since been covered, largely by clay and flows of basalt, so that in places a considerable thickness of overburden must be stripped. One mile west of Roza, Kittitas County, a smaller mass of diatomite outcrops over 3 acres and is at least 6 ft. thick, locally covered by 9 ft. of over-

burden. This was originally operated by the Great Western Silica Co. and the American Japanese Co.

The diatomite deposit located 15 mi. southeast of Quincy in Grant County is several square miles in area and is exposed in one large pit. It averages 12 ft. in thickness, with approximately 5 ft. of clay and basalt overburden. Several thousand tons have been produced from this deposit.

Northwest of Hatton in Adams County is a very white diatomite deposit of unknown area and overburden. This was utilized some time ago for the production of a polishing powder.

The deposits along Nookachamps Creek in Skagit County and those located between Woodinville and Redmond in King County were laid down in Pleistocene lakes and are exposed over extensive areas. These deposits have not been sufficiently worked to demonstrate their thickness and precise extent. They are apparently of excellent grade, except for a high moisture content, and are located near transportation.

Pumice—A very large number of deposits of volcanic ash have been located in the south-central part of the state, but only a few better-known deposits have been investigated. Thick beds are known near Pasco, Benton County, on Snipes Mountain near Outlook, Yakima County, and near Beverly in Grant County. Reliable reports of even more extensive deposits in the vicinity of several of the volcanic peaks, St. Helens, Adams and Glacier Peak, have appeared from time to time. No information is at present available as to the exact amounts, accessibility, character, or composition of any of the pumice deposits.

Sandstone—Sandstones excellently suited to the manufacture of grindstones, pulpstones, millstones, and rubbing stones are found in both Pierce and Thurston Counties. Of recent years the only reported production has been of holystones by the Western Quarry Co. of Tenino, Thurston County, and pulpstones by the Walker Cut Stone Co. of Wilkeson, Pierce County.

Asbestos

Asbestos has been produced in Chelan County near Leavenworth in Okanogan County, 6 mi. southwest of Pateros, and in Skagit County. Good quality asbestos has also been reported from near Hamilton, from Lyman, and along Skagit River in the foothills of the Cascades, in Skagit County, and also from a point located 8 mi. east of Chewelah in Stevens County. The Skagit County production has been used recently in the manufacture of a fireproof paint. The asbestos from Pateros is reported to occur as massive lenses near the margin of granitic rocks, suggesting a genetic relation to the intrusive. It is probable that all reported occurrences of asbestos are in metamorphic rocks and, considering the area of rocks of this type within the state, it seems reasonable to expect the discovery of a large number of excellent deposits.

Barite

Barite has not been produced commercially in Washington, but a vein has been reported in calcareous argillite from Sec. 11, T. 30 N., R. 38 E., Stevens County. Barite is also found as a gangue mineral in some ore deposits in northeastern Washington, so that further investigation is warranted.

Cement

Materials suitable for the manufacture of Portland cement are found in large quantities in the northern half of the state. The counties in which limestones are known are: Pend Oreille, Stevens, Ferry, Okanogan, Chelan, Kittitas, Whatcom, Skagit, Snohomish, King, San Juan, and Asotin. The last-named county has the only limestone beds to be found in the southern half of the state. Details of the geological characteristics of these stones will be presented later under *Stone*. Many of the limestones of northeastern Washington are unsuitable for the manufacture of Portland cement because of a high magnesia content, but there are, even so, sufficient quantities of limestone of satisfactory grade to support a very large cement industry. Throughout the state are many clay, shale, and argillite beds of composition well suited to the manufacture of Portland cement. Many of these are adjacent to suitable limestones, making an ideal combination for the economical production of a high-grade product. The argillite used at the Metalline Falls plant was deposited originally as clay but has become compact and laminated during the folding of the thick sedimentary series of which it is a part. Many argillites of essentially the same age are to be found throughout northern Washington, all showing the effects of folding, the originally-horizontal bedding planes being highly tilted.

The first Portland cement produced in the state was manufactured in 1907 by the Washington Portland Cement Co. at Concrete in Skagit County. In rapid succession the Superior Portland Cement Co. at Concrete, the Inland Portland Cement Co. (later changed to Lehigh Portland Cement Co.) at Metalline Falls, the International Cement Co. at Spokane, and the Olympic Portland Cement Co., Ltd., at Bellingham started producing. Since 1913 the Pacific Coast Cement Co. at Seattle, and the Northwestern Portland Cement Co. at Grotto have started operation.

Clay

The State of Washington is abundantly endowed with clay resources. Beds of almost any composition or physical character can be obtained, while the greatest variety of clays is perhaps to be found in Stevens and Spokane Counties. Clays of excellent character for special uses are to be found in King and Pierce Counties, while common clay is present in practically every locality in the state. The individual deposits are much too important and too numerous to be listed in this brief article. A large number of geological occurrences are represented in the clay deposits.

There are residual clays derived from weathering in place of such rocks as basalt, granite, gneiss, sandstone, shale, limestone, dolomite, and schist. Some of these residual clays have slipped down slopes on valley flats. In some instances fluviatile and lacustrine clays have been left as terraces along

rejuvenated streams. Marine clays dating back to Tertiary time are worked in the western part of the state and for the most part must be mined by underground methods, since they are interbedded with other sediments in the thick series. The more recent clays, including those related to the glacial period, have a more wide distribution in the northern part of the state and in the main can be worked from open pits.

Feldspar

While a considerable number of occurrences of feldspar have been reported in various parts of the state, but one is known at present which promises to be of commercial character. This lies in Sec. 35, T. 35 N., R. 45 E. in Pend Oreille County. The feldspar here is almost white in color, a potassium aluminum silicate of the variety known as microcline. In view of the geological character of the rocks throughout the northern part of the state, it is highly probable that other beds of feldspar will be located.

Fluorite

A small amount of fluorite has been produced by C. A. Fogarty near Keller in Ferry County from a 16-in. vertical vein between walls of granite. The margins of this deposit show the outlines of cubical crystals and the mass may be readily cleaved into large transparent octahedra that show the typical pale tones of green with zonal bands of violet. At present H. Comitchem is concerned with the development of another property in this district which certainly warrants further and more careful investigation.

Graphite

Graphite is reported from numerous occurrences of schist along the western foothills of the Cascade Mountains in Skagit, Pierce and Lewis Counties, in the higher Cascades in Lewis County, and in Chelan County. The development of a crystalline deposit in Chelan County has been undertaken but has been handicapped by its inaccessibility. Shipments have been reported from near Samish Lake in Skagit County.

In view of the high degree of metamorphism to which the Paleozoic beds of the northern portion of the state have been subjected and the relatively large proportion of carbonaceous sediments known to have been laid down, it is highly probable that considerable graphite may be discovered in the future.

Lime

Most of the limestone used in manufacturing lime in Washington has been secured in San Juan, Stevens and Whatcom Counties. This state has extensive limestone bodies in most of the northern counties, some of these capable of producing nearly pure calcium carbonate in very large amounts. All the limestones of Washington are geologically old and have been involved in major earth movements. This has resulted in much folding and recrystallization into marble. Many of these limestones, originally deposited in a horizontal position, have been tilted on edge and highly fractured. In many of the deposits quarry faces can be developed over 100 ft. in height above the adjoining valley floor.

Magnesium Compounds

The magnesium compounds available and used in the State of Washington are dolomite, magnesite and magnesium sulphate.

Dolomite.—Many of the calcareous rocks of northeastern Washington contain magnesium carbonate and range in composition from nearly pure limestone to nearly pure magnesite. Several dolomitic deposits containing about equal amounts of calcium and magnesium carbonates are known. In only one place, near Colville, Stevens County, has dolomite been quarried and calcined. The Tulare Mining Co. started producing dolomite in 1917 and continued to operate for several years. Surface sampling indicates dolomite of excellent grade extending for a length of 2,200 ft., 550 ft. in a vertical direction, and for an unknown width. From all indications practically an unlimited supply is available from this locality. Two quarries have been opened in this deposit and the dolomite obtained was calcined in two vertical kilns.

The product of this operation was employed by paper mills in making sulphite liquor used in the preparation of wood pulp. More recently dolomitic limestones of various shades of red and gray have been used as granules in the stucco industry. A large tonnage of such dolomite is available in Stevens and Pend Oreille Counties.

Magnesium Sulphate (Epsomite).—In Okanogan County, near Oroville, epsomite has been produced from two small lakes. The first production was taken from Spotted Lake, which is named from its characteristic appearance during the dry season when part of the epsomite is crystallized in patches and lanes of brine intervene. This lake has an area of about 4 acres and the maximum thickness of epsomite in it is about 20 ft. Epso Lake covers about 15 acres, with 30 ft. of epsomite as a maximum. In this deposit mining is necessary to win the salt, which is beneath 20 ft. of mud, whereas in Spotted Lake the salt can be removed as a brine and pumped to the refining plant. Epsomite of exceptional purity has been produced from this locality, but most of the product contains minute quantities of mud that must be eliminated by settling and recyrstallization.

The drainage basins of these lakes are small, containing zones of pyrite and pyrrhotite associated with dolomite. It is supposed that oxidation of the pyrite and pyrrhotite produced sulphuric acid, which reacted with the dolomite to form epsomite and gypsum. The epsomite, which is soluble, was washed into the lakes, leaving the insoluble gypsum behind.

Magnesite.—The United States until 1914 depended chiefly on a supply of magnesite from Austria-Hungary. With the inception of the World War this supply was cut off and an active interest was created in finding and developing a domestic supply. In 1916 the immense deposits of magnesite existing west of Chewelah, Stevens County, were recognized and immediately developed. The

magnesite is found in lens-shaped masses replacing a dolomite, which extends about 20 mi. and averages over 1,000 ft. in width.

In this area there are seven large deposits of magnesite controlled by the Northwest Magnesite Co., the American Mineral Production Co., and the American Refractories Co. The Northwest Magnesite Co. is the only one that has been active for the past few years and even this company has been operating on a curtailed schedule. The entire production originally was marketed for use as refractories but, with suspension of the World War, the sharp decline of the market caused a search for other uses, chiefly in the building trade. The magnesite used in building, termed caustic calcined magnesite, is calcined at a considerably lower temperature than the dead-burned magnesite used for refractories, so as to retain a small percentage of carbon dioxide. Caustic calcined magnesite was originally used for flooring. Later a wide use as stucco was developed but this has declined in favor of other materials. Caustic calcined magnesite has also been manufactured into magnesite lumber, shingles, and wall-boards.

The Northwest Magnesite Co. operates its Finch quarry, which is the one closest to transportation. The quarry is operated as a series of quarry faces. The magnesite is crushed to 2 in. in size and is transported 4 mi. by aerial tramway to the plant on the Great Northern Railroad. Here crushing is completed and iron oxide intimately mixed with the magnesite before it is calcined to dead-burned magnesite. Caustic calcined magnesite does not have iron oxide added to it. The calcining is done in six rotary kilns fired by powdered coal and the final sizing is done by rolls. The location of the plant in an agricultural district occasioned several lawsuits over alleged dust damage, so a Cottrell dust-precipitating plant was installed.

Sand and Gravel

The State of Washington is very fortunate in having abundant supplies of sand and gravel. All the northern part of the state was covered during the glacial period by ice that traveled south from British Columbia, carrying with it immense quantities of *débris*. This was reworked by glacial streams that produced immense stratified deposits of very fresh sand and gravel. Most of the southern part of the state not covered by glacial ice was crossed by glacial streams heavily loaded with sand and gravel which was deposited along their courses. Only a few areas in the southern part of the state are almost devoid of sand and gravel. These areas are the Palouse Country, part of the upland south of Snake River and Willapa Hills.

A few sand-and-gravel deposits have the desired size of material for direct use without washing and screening. The material from most of the deposits, however, is both washed and screened to produce the correct sizes. Those deposits situated along Puget Sound and in places along Columbia River rise from 50 to 300 ft. above the water's edge, allowing a gravity flow of the material to the washing and screening plants, whence it goes either to bunkers to be loaded into barges or directly into the barges. Slightly higher operating costs are usual for deposits moved by railways or motor trucks.

Silica

Washington is abundantly supplied with silica, mainly in the form of quartzite beds and pegmatitic segregations from intrusive granitic masses. So far, no large amount of good glass sand has been reported. A mound-shaped pegmatitic mass of almost pure quartz, 650 ft. in diameter and 200 ft. in height, stands above the valley floor north of Spokane. This quartz is a differentiation product of the Loon Lake granite and is remarkably free from iron and other impurities. It has been utilized in a small way for the manufacture of silica brick. Many other less-pure quartz pegmatite masses are known in Spokane County and have been reported from most of the other counties in the northern part of the state. Quartzites of varying degrees of purity are found on both flanks of the Cascades and in the northeastern portion of the state. These quartzites were originally deposited as sands along an ancient coastline and, after burial and consolidation, were thoroughly cemented with silica. These superlatively-hard strata have been thrown into extensive folds throughout the mountainous area.

In the manufacture of silica brick the Denny Renton Co. of Seattle uses silica from a deposit east of Enumclaw in King County.

Slate

Only one slate quarry has been developed in Washington and it is located 10 mi. west of Valley in Stevens County. The slate is gray to green in color, splits rather thinly, and is apparently strong. It is somewhat cross-fractured, but probably not enough seriously to affect the producing of rather large blocks. There are many other slates in northern Washington showing good cleavage that may be of value in the future. These slates have a history similar to that of the quartzites, but, being composed of finer particles, mostly other than quartz, they have yielded more readily to pressures during folding. A uniform orientation of flat minerals, such as mica, has resulted, thus allowing the rock to split more easily in one direction.

Sodium Sulphate (Glauberite)

A considerable tonnage of glauberite has been produced from a deposit in Sec. 15 and 16, T. 17 N., R. 28 E., some 12 mi. west of Warden in Grant County. The deposit is reported to extend over an area of about 80 acres, ranging from a few inches to as much as 20 ft. in thickness. Other deposits of glauberite in Okanogan County near the town of Ophir indicate a considerable supply of this material in the north-central part of the state.

Stone

Stone is plentiful in the State of Washington, of wide distribution, and of many varieties. While mostly used for road metal, railroad ballast, riprap, and cement, small amounts are used for curbing, paving blocks, monuments and buildings. The

only varieties considered here are basalt, granite, limestone and sandstone.

Basalt.—Basalt is extensively distributed throughout the state and is widely used as road material, and to a lesser extent it appears in foundations and occasionally in walls. Most of the basalt of the state is of Tertiary age, having been poured forth through many fissure vents to flow over the surface of the ground. While individual flows are rarely over 200 ft. thick, they have been piled up until in places several thousand feet of basalt has accumulated. Owing to this wide distribution of basalt, very large quarries have been developed in it. Transportation is rarely a factor in the use of this type of crushed rock. In the few places where a considerable demand for basalt exists, permanent quarries that show a steady production are maintained.

Granite.—Granite is another rock abundant within the state, if we include the several granitic varieties including syenite, diorite, granodiorite, and monzonite. Quarries have been developed at Index and Baring in Snohomish County, near Medical Lake and Spokane River in Spokane County, and near Wawawai in Whitman County. Even greater quantities are known in Chelan, Ferry, King, Okanogan, Pend Oreille, Skagit, Stevens and Whatcom Counties.

The granitic rock of the state is considerably older than the basalt and represents a rock, once molten, which forced its way toward the surface but still remained buried and cooled at great depths. Its present exposure is due to the removal of many thousand feet of older rock which previously covered it. This uncovering has involved the uplift of these portions of the earth to the present position and necessarily this has been accomplished in part by deformation of the rock masses. The availability of such masses is therefore closely related to the character and amount of deformation to which they have been subjected. Masses in which excellent dimension material can presumably be obtained are known, however.

Limestone and Marble.—So far very little limestone or marble has been quarried for building blocks. Most of the deposits throughout the state have been fractured during the folding of the rocks so that dimension material is rarely obtainable. The chief uses of limestone for Washington, other than the uses mentioned under *Cement* and *Lime,* is for flux and in the agricultural, sugar, and paper industries. Lime has been produced for flux from Pend Oreille, San Juan and Whatcom Counties.

Sandstone.—The principal sandstone quarries of the state are located in King, Pierce, Thurston and Whatcom Counties. Most counties in western Washington have abundant sandstone formations from which good material may be quarried. Kittitas and Chelan Counties have provided the only available material so far in eastern Washington. The sandstones utilized are geologically young. They are mostly deposits made near the mountainous areas during the early part of the Tertiary period. Marine beds laid down at the same time have not as yet proved available for any extensive commercial operations. Since deposition the Tertiary sediments have been subjected to more or less extensive folding. In the main this slight folding has been beneficial, developing a certain degree of minor jointing which greatly facilitates quarry operations without interfering with the production of dimension stone.

Miscellaneous Stones.—Within recent years Stevens and Chelan Counties have been the main sites of a newly-developing industry—the production of granules for stucco facings. With the extensive varieties of rock types a very extraordinary range in colors is available. The quarries are small and numerous and only portable equipment is utilized.

Strontium

Strontium has been produced in Skagit County from the minerals celestite and strontianite which were found in a vein in a low serpentine hill. An estimated reserve of 10,000 tons of commercial strontium-bearing material above water level in this one hill has been reported. Another fairly extensive deposit containing strontium has been reported from Whatcom County near Ruby Creek, above the Skagit River gorge, this being a relatively little known portion of the county. It appears that a considerable tonnage of commercial strontium-bearing material may be developed there.

Talc

Talc deposits are known 9 mi. north of Mondovi, Lincoln County, near Marblemount and 7 mi. from Anacortes in Skagit County. To date the only production of talc in the state has been by the Western Talc Co. from the Lincoln County deposits. The composition of this talc as obtained from analysis is:

Silica	46.02 per cent.
Alumina	11.13 per cent.
Lime	.66 per cent.
Magnesia	35.68 per cent.
Iron Oxide	.43 per cent.
Moisture and Ignition Loss	6.17 per cent.

The talc is ground to 200-mesh, is bagged and shipped to paper mills for use as a filler. It is certain that extensive talc deposits may be found within that portion of the state in which the rocks have been extensively metamorphosed.

Plan for Coated Abrasive Products Is Submitted to Industry

The simplified practice recommendation covering coated abrasive products, as revised by the standing committee of the industry, has been submitted by the division of simplified practice of the Bureau of Standards, to all interests for written approval.

In the original recommendation, the number of sizes and types of coated abrasive products was reduced from 8,000 to 1,976. Under the proposed revision, certain changes were made which further reduced that number to 1,949.

The revised recommendation will become effective one month after the division's formal announcement that the required degree of support has been received.

This view of the Consolidated plant shows four of its five distinct units.

Sedimentary Limestone Found in Florida Requires Unusual Processing

Plant of Consolidated Rock Products Co. Fine Example of This Type of Operation

CRUSHED-STONE production in Florida presents a picture somewhat different from that of other states. Both quarrying and processing practices are by necessity adapted to handling an entirely different type of material, for limestone such as we are familiar with the country over does not exist in commercial quantities in the Peninsula State.

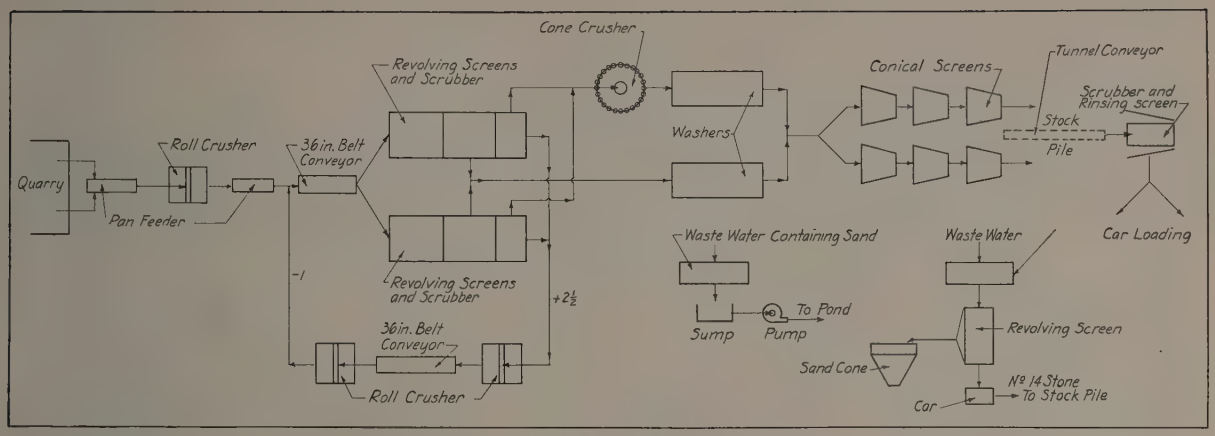
Limestone deposits in Florida are found principally in a sedimentary state, being largely a conglomerate precipitate of former sea-life. As such it is termed shell rock or lime rock. Lime rock as found in most deposits is a relatively soft, cream-colored material. A small lump is quite easily crushed in the hand. Recent articles in PIT AND QUARRY described its uses for pavement bases and lime products, and the methods of recoving this material.

In some of the Florida lime-rock deposits a portion of the material is found to be crystallized and is, therefore, quite hard. It is this hard flint-like stone that is used for aggregate and ballast purposes in the Peninsula district. Associated with it usually is considerable soft lime-rock and clay, all which are objectionable and must be removed. Experience has proved that, after primary crushing, the material is best handled by initial classification, crushing of the "oversize," and thorough scrubbing of the classified material, after which the scrubbed stone is separated into commercial sizes by standard washing screens. Through this method the soft lime-rock becomes reduced to sand and is eliminated from the hard stone through its suspension in the wash-water. As can be expected, a plant designed to handle material such as this requires equipment not ordinarily found in crushed-stone operations in other states.

For an example of a typical Florida crushed-stone plant no better one could be visited and inspected than that of the Consolidated Rock Products Co. near Brooksville, Fla. While not a recently-built plant it is representative of good practice in nearly all its phases. Some idea of its size can be gained from the fact that its daily production averages in excess of 1,500 tons. A. M. Luttrell is superintendent of all operations of the company, of which W. P. McDonald is president.

Located on a 1,500-acre tract of land, the company has ample raw material at its disposal for many years to come. Its quarry is developed in several directions to provide a constant source of material, each working position being independent of every other one. A broadside view of the plant will reveal it to consist of five distinct units. These are, in flow-sheet order, the primary-crushing department located in the first building, the preliminary screening and scrubbing department, the finish screening department which also includes the finished-materials stock-piles, the rinsing and car-loading department, and, finally, the department for the handling and processing of sand.

The 45-ft. quarry face is drilled much as in other quarries, but the holes are sprung before final loading. Two well-drills, both Keystone machines, are employed. Holes 3½ in. in diameter are drilled to a depth varying from 47 to 50 ft., usually on 18-ft.



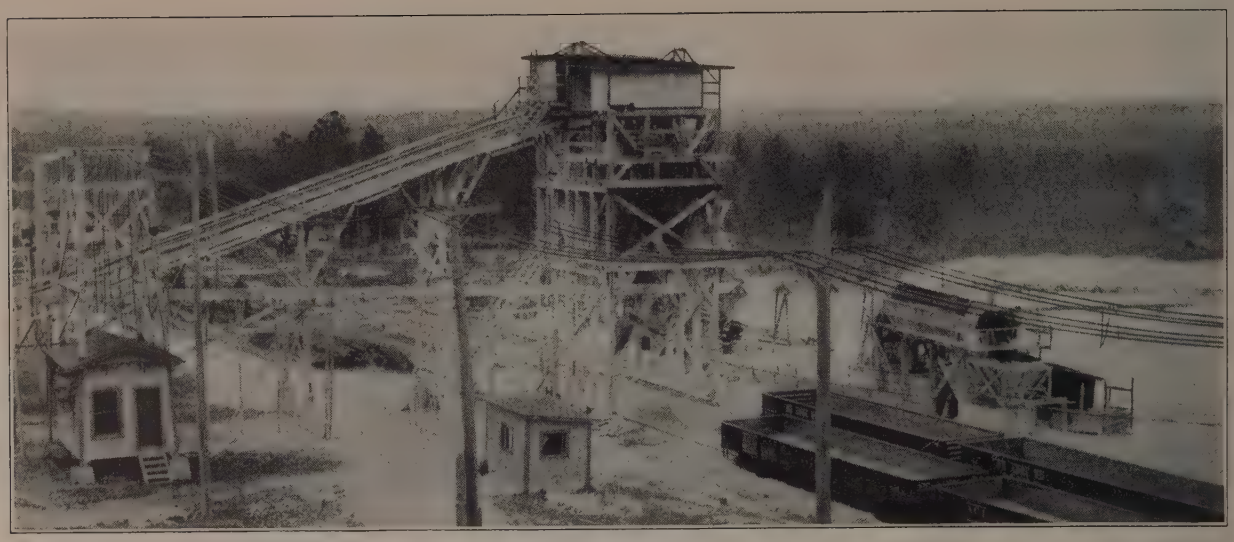
Flow-sheet of operations at Consolidated Rock Products Co. plant.

by 25-ft. centers. When a blast is planned, the holes are sprung by the detonation of 3 to 4 cases of 30-per cent. dynamite placed in the bottoms. The large cavity resulting is then charged with du Pont FF blasting powder to the amount of from 100 kegs up to 250 kegs per hole, depending on the burden carried. These charges are detonated by Cordeau-Bickford fuse. The yield varies between 4 and 6 tons of rock from 1 lb. of powder. Not more than four holes are blasted at one time. This method of blasting is common in all Florida lime-rock quarries, as the nature of the soft material requires a heaving rather than a shattering action.

Blasted rock is loaded from the two recovery positions by means of two Marion 30B, 1-cu.yd. shovels into four Easton 7-cu.yd. side-dump cars. Each of the shovels is served by two cars on separate tracks, and these tracks are continuous, from the loading position up the plant incline to the car-dumping point. The loaded cars are drawn from the loading positions by long cables from a Mundy 2-drum hoist located at the rear of the crusher hopper. Cars are returned to the loading positions by gravity under control of the hoist.

Upon arrival at the top of the incline, each car is dumped, the material being received by an Allis-Chalmers 48-in. by 20-ft. pan-conveyor feeder. The car body is raised to a dumping position by a hook-and-tackle line from a hoist; through a counterweight the body is swung back to its chassis. From

Main conveyor leading to the screening plant. ***Inset at left*****—Supt. A. M. Luttrell.**



A view of the car-loading plant. Power-distribution and control house at left.

the feeder the material passes through a Pennsylvania 30-in. by 60-in. roll-crusher, which is driven by a 150-hp. General Electric motor and reduces the stone to a maximum size of 4 in. A Stephens-Adamson pan-feeder then delivers the material to a 36-in. belt-conveyor which carries it to two Stephens-Adamson No. 10 revolving screens. These units are 60 in. in diameter and 32 ft. in length and are equipped with 1½-in. and 2½-in. screen panels and 15-ft. scrubber sections. Here large volumes of water are added and the material receives its first scrubbing and screening. Material passing the 1½-in. screen panels is directed immediately to the Allis-Chalmers 25-ft., twin-screw log-washers beneath. Plus-1½-in. stone is sent to a Symons 2-ft. cone crusher, where it is reduced to any size desired. It is then sent to an Allis-Chalmers 16-ft. all-steel log-washer for its final scrubbing. The plus-2½-in. stone rejected from the two No. 10 screens is sent to two crushers, which are operated in series and in closed-circuit with the screens. The first crusher in the series is a Buchanan roll-type, driven by a 100-hp. motor. It is set at 2½-in. breakage and from it the crushed stone is conducted by a 36-in. belt-conveyor for a distance of 100 ft. to an Allis-Chalmers roll-crusher which is set at 1-in. and is driven by a 100-hp. Allis-Chalmers motor. The minus-1-in. stone from this crusher is then spouted to the conveyor leading to the two No. 10 screens.

The crushing, screening and scrubbing system just described lends itself readily to volume production of any size or number of sizes of stone. In either branch of the circuit the stone is sent through log-washers for thorough scrubbing and, as it passes to the screening-plant conveyor, it is as clean a product as is produced anywhere.

Hoists which draw the loaded cars up the incline from the quarry.

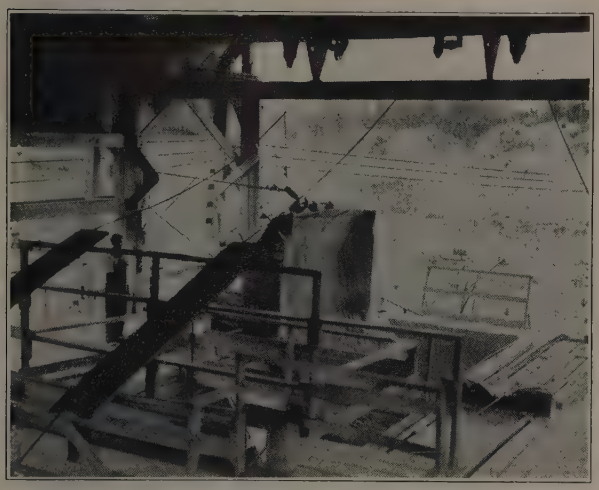
Shovel loading a car in the quarry.

As this portion of the plant requires the greatest volume of wash-water, the gravity tank and pumping system is located adjacent to it. The system consists of a deep-well turbine pump with a 25,000-gal. gravity tank, the top of which is 130 ft. above the ground level. The well-pump is a 12-in. Worthington Coniflo unit with its 10 bowls set 648 ft. below the ground. The pump delivers 3,000 gal. per min. at a pressure of 55 lb., and is driven by a

direct-connected 250-hp. vertical motor. More than 1,300,000 gal. of water is pumped daily—each ton of product is washed with nearly 3,000 gal. of water.

A 30-in. conveyor receives the material discharged from the log-washers and transports it to the screening plant. Here the crushed material is divided and sent through two gangs of 84-in. Gilbert screens, each gang containing three screening units. No. 2 stone is made on the first pair of screens, No. 3 stone on the second pair, No. 4 stone on the third pair, and sand is recovered by jackets on the last pair of screens.

Finished materials from the screens are spouted to a ground-storage system of stock-piles beneath the screening building. This system consists of two



Quarry car being dumped over the roll-crusher feeder.

groups of wedge-shaped piles, the groups being located opposite each other with the screening building between them. The wedge points of the piles extend and overlap each other underneath the screening building, so the finished materials fall in a nearly vertical line to the points of their respective wedge-shaped piles. When the points fill with material, Sauerman 2-cu.yd. power drag-scrapers

Conical screens used for classification of material.

(one on each stock-pile group) haul the material out on long piles. At least 90,000 tons of materials can be stocked with this system.

Obviously, with the points of the wedge-shaped piles overlapping each other directly beneath the screening house, a tunnel conveyor installed beneath them would provide an ideal method of recovering the materials, and this is exactly what has been done at this plant. Here a tunnel 7 ft. high and 10 ft. wide, built of reinforced concrete, extends underneath the piles and a 30-in. belt-conveyor within recovers any size stone or proportion of sizes from the piles through clam-shell gates installed in the tunnel roof. The tunnel conveyor, approximately 200 ft. long between centers, inclines from the tunnel to a small building spanning the company's railroad side-track. In the top of this building is located an improved cylinder-type scrubber with a conical screen. Materials for shipment are received from the tunnel conveyor and sent through the scrubber for a thorough treatment, after which they are discharged to the screen panels (part of the scrubber-screen unit) where a final spray of rinsing water is poured on them. Two cars can be

The preliminary screening, scrubbing and crushing plant.

One of the roll-crusher installations.

Loading a car at the rinsing chutes.

loaded simultaneously, there being a track beneath the building between its columns and a track alongside. One provides service over the Seaboard Air-line Railway and the other over the Atlantic Coast Line Railway.

The sand-recovery department, while located opposite the loading plant, really begins at the preliminary screening and scrubbing plant. Here the wash-water discharged from the screens and scrubbers is flumed to a sump. Concrete areas surrounding this part of the plant are flushed and this flush-water, containing sand and other spillage, is drained to the sump, where a Georgia Iron Works 6-in. sand-pump (driven by a 30-hp. motor) sends the water-sludge to the sand plant. Here it is flumed, with the waste-water of the screening and rinsing plants, to a large pond for settling or to a 60-in. by 20-ft. rotary screen, which has a 1/8-in. screen panel and separates pea gravel from the sand. The latter is flumed to a Link-Belt cone and the waste from it goes to the pond. The pea gravel is sent out to a pile by a small car operating on an incline.

A modern electric-power distribution system is one of the plant's principal features. A substation on the company's property receives power at 22,000

The deep-well turbine pump.

v. and reduces it to 440 v. From the substation the power is sent to three control houses serving three principal sets of machinery. An interlocking system installed on the entire series of motors provides protection for each unit in case of the failure of any other unit. Motors are started beginning with the last in the series and are stopped beginning with the first in the series.

Certain mechanical items are standard throughout the plant. These include motors of General Electric manufacture and control apparatus of the same make. All conveyors were made by Stephens-Adamson and are equipped for the most part with Manhattan belting.

New Jersey Stone Plant Rebuilt

(*Continued from page 42*)

main conveyor feeding to the plant has a structural steel frame and is inclosed with corrugated metal.

The central-mixing plant was originally built several years ago but was rebuilt and much enlarged in the spring of 1931. It now has a capacity of 1,200 cu.yd. of concrete per day and an additional large dry-batching capacity.

Separate systems handle the cement, sand, and gravel in this plant. Sand is handled by locomotive crane from barges or stock-piles to a hopper feeding an inclined conveyor leading to the top of the plant. Sacked cement is unloaded from cars and is discharged from hand trucks to a belt-conveyor which carries it to the batching floor of the plant where it is rehandled in the same way.

Truck-loads of stone are dumped to two concrete hoppers from which belt-feeders discharge to two belt-bucket elevators. These in turn discharge to three steel surge-bins. This entire unit is housed in a steel-frame building inclosed with corrugated metal. A belt-feeder under these bins discharges to an inclined conveyor leading to the top of the plant. Each of the two elevators is driven by a 25-hp. General Electric motor through a Link-Belt speed-reducer and chain, and the main conveyor is driven through a Jones speed-reducer.

Each of the sand and crushed-stone conveyors discharges to an individual shuttle conveyor, which distributes the material to the desired bin compartments. Two 300-ton bins are used for concrete aggregates. The cement and aggregates are measured in Blaw-Knox weighing batchers with Fairbanks scales. Mixing is done in two 3-cu.yd. Ransome mixers, which load trucks inside the building. Concrete is delivered by 17 Blaw-Knox agitator-trucks.

The other two 300-ton bins in this building are used for dry-batching aggregates and loading batcher trucks. Aggregates are batched to two specially-designed gantry cranes under these bins. Each of these has 12 batch-boxes of 42-cu.ft. capacity, allowing rapid loading to take care of any possible peak demand as well as the provision of reserve storage when there is a shortage of trucks.

The two bucket-elevators were furnished by the Link-Belt Co. and the belt-conveyors by the Barber-Greene Co. The bins and weighing batchers are all Blaw-Knox.

The company also has an aggregate-batching plant at Fort Lee, N. J.

Clay for Filtering and Bleaching Oils Is Refined by Western Operator

Product of California Plant Finds Ready Market in Uses Similar to Fullers' Earth

THE State of California claims, among other distinctions, that it produces as wide a variety of nonmetallic minerals as any other state in the Union. This is a rather sweeping assertion, but, after scanning the list of these products, one is forced to admit that there is some basis for such a claim. This list includes all the more common products, such as cement, lime, gypsum, crushed stone and sand and gravel, as well as innumerable products of minor importance, some of which are found in few other localities.

One of the least known of these products but one which plays an important part in the progress of several of the major industries of California is filter and bleaching clay. The Olancha Mineral Products Co., Ltd., of Los Angeles, Cal., on August 1, 1931, put into operation a modern new plant for the production of this clay on a commercial scale. Its chief value lies in its bleaching and filtering properties which are similar to those of fuller's earth. The various grades produced are suitable for filtering and bleaching practically every kind of mineral, vegetable, and fish oil.

The deposits from which this plant is supplied are located near Olancha, Cal., on the east edge of Owens Valley, about 200 mi. northeast of Los Angeles. The property consists of 1,280 acres on which test holes bored up to date on one deposit show in excess of 4,000,000 tons of high-grade clay. There are also two other deposits on the property which have not yet been developed.

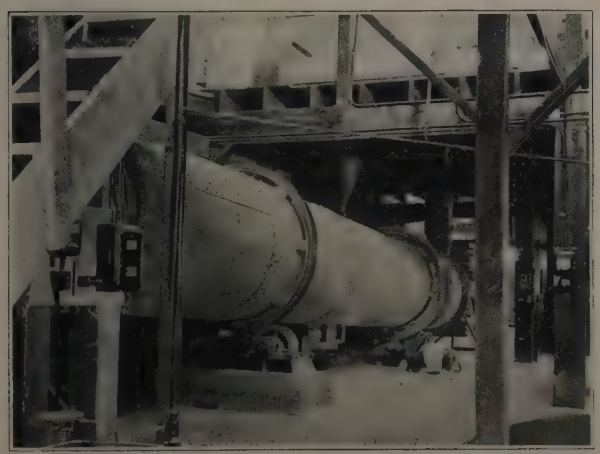
The deposit being worked is unique as it is all above the surrounding ground level. It varies from 30 ft. to 110 ft. in depth and has an overburden of from 2 to 5 ft. of loose rhyolite or broken lava. The material is massive with a few minor faults here and there and runs quite uniform in quality.

The clay-like raw material is a decomposed feldspar very similar to fuller's earth. Its value lies in the fact that it is an absolutely neutral material and requires no treatment of any kind to make it suitable for use by either the edible- or mineral-oil industries. Two typical analyses of this material are given below:

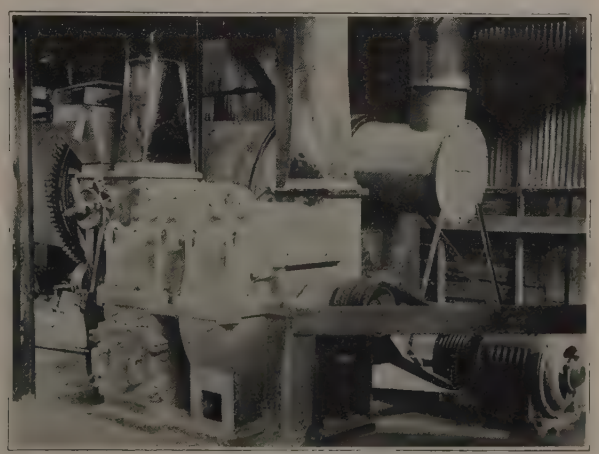
	Sample No. 1	*Sample No. 2*
SiO_2	65.30 per cent.	59.76 per cent.
Al_2O_3	15.04 " "	10.99 " "
Fe_2O_3	4.58 " "	4.59 " "
CaO	1.50 " "	1.60 " "
MgO	2.44 " "	4.07 " "
Fe	2.96 " "	16.55 " "
Volatile on ignition	8.38 " "	2.12 " "

The loose overburden is removed from the deposit by a small drag-scraper. At least 10,000 tons of material is kept uncovered and tested in advance. No drilling or blasting is necessary because of the softness of the clay. A ⅜-cu. yd. gasoline-engine shovel loads into trucks, which haul it a distance of 12 mi. to the Southern Pacific Ry. Here the clay is loaded into cars for shipment to the plant.

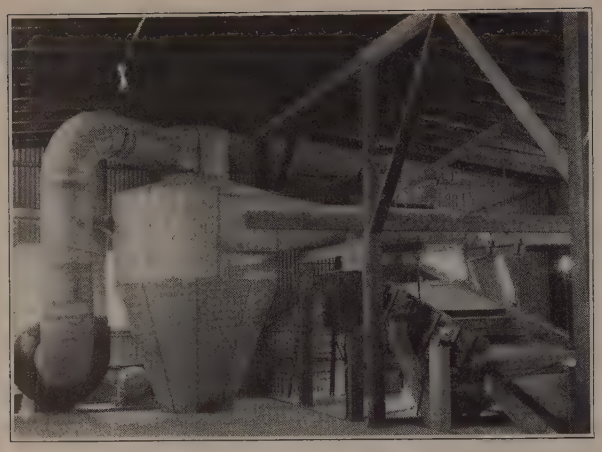
The plant is located at 6300 E. Slauson Ave., in what is known as the Central Manufacturing District of Los Angeles. This rapidly-growing industrial area is about 8 mi. southeast of the heart of the city. The plant building is of modern construction with concrete foundations, timber superstructure, and corrugated-metal siding and roofing. The last-named material was furnished by the American Sheet & Tin Plate Co. The capacity of the plant is 3½ tons per hr. on the two shifts now being used. The plant is designed so that its ca-



Rotary drier in plant of Olancha Mineral Products Co.



Impact-pulverizer with rotary drier in background.



Blower, cyclone and the electric screens.

A side view of the three electric screens.

pacity can be doubled by adding additional machinery for which space has been provided. The plant was designed by the Allied Engineers of Los Angeles in coöperation with Geo. A. Schwabland, technical director of the company.

The clay is unloaded from the gondola cars at the plant by manual labor into a storage building which is open on the side toward the switch-track. A ⅓-cu. yd. homemade drag-scraper distributes the material over the storage, which has a total capacity of 400 tons. The scraper also feeds the material as needed through a 4-in. bar grizzly into a hopper feeding a bucket-elevator. Material retained on the grizzly is sledged through. The scraper is operated by a 2-drum Williams hoist driven by a 3-hp. U. S. motor.

The Link-Belt chain-bucket elevator operates on 23-ft. centers and discharges to a Gruendler No. X hammer pulverizer which has a capacity of 7 tons per hr. This discharges directly into a Standard Boiler & Steel Works 5-ft. by 40-ft. rotary drier, which is fitted with a seal-ring furnished by the same company. This has an indirect-heat firebox at the feed end and has induced draft. Natural gas furnished by the Southern California Gas Co. is used as fuel at 5-lb. pressure. The firebox is equipped with Leahy Manufacturing Co. multi-jet burners. Drying is controlled by a Foxboro automatic temperature recorder and controller. A gas pressure-reduction station outside the plant has a Westinghouse gas meter and a Bristol recording temperature gauge.

The drier discharges to a bucket-elevator, which operates on 23-ft. centers and discharges to a selective split chute. One side discharges directly to the Raymond mill feed-bin. The other feeds to a series of three Traylor Vibrator Co. 3-ft. by 4-ft. single-deck vibrating screens suspended in tandem. Wire cloth is used on all three screens in sizes of ¼-in., 10-mesh, and 60-mesh, respectively. Of the four sizes produced, only that passing the 60-mesh screen is considered a finished product and is chuted to the finish bin.

Pressure-reducer and meters on the natural-gas line leading to the plant.

New filter-clay plant of Olancha Mineral Products Co.

The three coarse sizes, plus ¼-in., 10-mesh to ¼-in., and 60-mesh to 10-mesh, go into the Raymond mill feed-bin. This feeds through a chute into the Raymond No. 50 impact pulverizer for final reduction. The product of the mill is blown to a cyclone from which the "oversize" is sent back to the mill. The exhaust air, with a content of about 2 per cent. of fine dust, is fed by a Clarage fan to two Raymond multiple-tube dust-collectors from which sacks are filled direct. The finished product goes from the cyclone to a 35-ton bin over the Bates 1-tube packer. All the product is marketed in Bates multi-wall paper bags in 100-, 80- and 23-lb. sizes. The "oversize" from the 60-mesh screen can

also be chuted direct to a 12-ton steel bin for sacking. As was previously mentioned, the drier firebox has no stack and the draft is induced by a Reece fan to a second cyclone. The "oversize" from this unit also goes to the Raymond bin. A Fairbanks platform scale is used for checking sack weights.

All the motor drives, except that of the hoist, are of the V-belt type. The two elevators are driven by 3- and 2-hp. U. S. motors, respectively, the Gruendler crusher by a 10-hp. U. S. motor, and the Raymond mill by a 50-hp. U. S. motor. The

The dust collectors on the second floor of the building.

Bates packer is driven by a 5-hp. Fairbanks-Morse motor and the Clarage fan by a 5-hp. U. S. motor. The drier and the Reece fan are driven by 7½-hp. and 25-hp. Sterling motors, respectively. Square D safety switches are used throughout the plant. Electricity is purchased at 440 v. from the California Edison Co. Three taps from the city water mains furnish adequate fire protection.

A completely-equipped laboratory, where tests are continually conducted to keep the product up to specifications, is maintained at the plant. From the time the raw material arrives at the plant until it is sacked all operations are under complete

Deposit where the raw material is obtained.

laboratory control. Research work, too, is carried on in all possible lines in which the product might be used. This work is done under the personal supervision of Geo. A. Schwabland, technical director of the company. An illustration of the cars taken by the company that its products shall be suitable for the uses to which they are to be applied is seen in the fact that the company spent six months in intensive experiments to determine what size grind would be best suited to various industries before putting its products on the market.

The two principal products of this plant are "Olancha Earth 3X" and "Olancha Earth X." The former product will pass 95 per cent. through a 150-mesh screen and has its superfine dust removed by air-classification to a point where there is no possibility of any of the material going through filter paper and clouding up the oil being treated. This product has been found to be especially suited to the bleaching of vegetable and mineral oils. "Olancha Earth X" is ground to pass a 20-mesh and to be retained on a 60-mesh screen and is used for percolation. This product is especially good for gasoline, kerosene and other domestic and industrial oils and in the reclaiming of industrial wastes. It also gives good results on fish and vegetable oils. Some of the products are also suitable for perfumeries and similar purposes. Both domestic and export shipments are made.

The main office of the Olancha Mineral Products Co. is at 714 So. Hill St., Los Angeles, Cal.

Hammer-pulverizer which makes the preliminary reduction.

Scraper which recovers and distributes the clay in storage.

Convention and Road Show Draws 22,600 Highway Builders to Detroit

T. H. Cutler, Chief Engineer of Missouri State Highway Dept., Is Chosen President

W. R. Smith.

Thomas H. MacDonald.

PEOPLE interested in highway activities must organize to acquaint the public with the advantages of good roads and especially how roads can be built profitably and economically, according to W. R. Smith, president of the American Road Builders' Assn., in summarizing the results of the twenty-ninth annual convention and road show which assembled over 22,600 road builders in Detroit early this month.

"The gasoline tax is a highway tax," declared Mr. Smith, "and any diversion to purposes other than roads and streets will be opposed not only by those interested in highway activities but by twenty-six million motorists who are now contributing a large part of the funds used for road and street building."

The convention and road show held this year in the commodious city exposition building, in Detroit, was notable for the comprehensive and diversified exhibits of road building and maintenance equipment and material. Particular emphasis was given to low-cost road construction and maintenance, and the showing of motor trucks in which 90 per cent. of the truck manufacturers were represented with extensive displays. The exposition building was filled with exhibits and a marked interest was shown by the thousands who attended.

In the forty convention sessions the problems of construction and maintenance, traffic, motor freight, and other subjects related to highway activities were thoroughly aired and innumerable recommendations made.

At the general meeting on road and street planning, President Hoover contributed the statement that "the American Road Builders' Assn. is rendering an important public service not only in extending the highway system of the country, but in connection with an increased road building program as a means of employment. Road building by federal, state and city agencies is a major factor in unemployment relief." The meeting mobilized the army of state, county and city officials, engineers, contractors, commercial highway users, and manufacturers to fight any tendency to slow down construction projects in the name of economy, and to divert to other uses than road and street construction and maintenance the tax money derived from motor vehicles.

Thos. H. MacDonald, chief of the U. S. Bureau of Public Roads, in an address at the planning meeting, said that "the cost of road building is now 45 per cent. below the 1924 prices. The diversion of highway revenue taxes for other than state highway purposes is now $150,375,000 annually and the tendency to reach into these special highway taxes is the most alarming one with which we have to contend so far as the future of a stable and adequate road program is concerned."

The two developments in motor vehicles of major importance to the public pocketbook and better service, according to Mr. MacDonald, are the development of better pneumatic tires and the redesign of heavy motor vehicles to distribute the load on more wheels. "From the standpoint of the future of highway building, regardless of how commodities or people are carried by the various public transportation agencies, no matters now in controversy will affect more than a minor percentage of the use of the highways," he said. "Long-distance highway traffic has little effect on the necessity for road improvement or the volume of use of highways."

T. H. Cutler, chief engineer of the Missouri highway department, was elected president to take office in May. The City Officials' Division elected R. B. Brooks, director of public service, St. Louis, as president, and the County Highway Officials' Division elected W. O. Washington, county engineer, Brownsville, Texas.

The location of the next road show will be determined at the May meeting of the association in Washington, D. C., the national headquarters.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

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ADAM L. BECK
President and General Manager
Great Lakes Portland Cement Co.
Buffalo, N. Y.

Coming Events

Jan. 27-29, 1932. Pittsburgh, Pa. Annual convention, National Sand & Gravel Assn., Wm. Penn Hotel, V. P. Ahearn, executive secretary, Munsey Bldg., Washington, D. C.

Feb. 11, 1932. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

Feb. 23-26, 1932. Washington, D. C. Annual convention, American Concrete Institute, Wardman Park Hotel. Harvey Whipple, sec., 2970 West Grand Blvd., Detroit, Mich.

March 1-4, 1932. Washington, D. C. Twenty-eighth annual convention, American Concrete Institute. Harvey Whipple, secretary-treasurer, 2970 West Grand Blvd., Detroit, Mich.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These are printed in this column each issue.*

Fifteen Years Ago

SALE of the sand-and-gravel holdings of the Valley Sand Co. of Zanesville, O., to the Burton-Townsend Co., also of Louisville, was announced. Included in the transaction was a large tract of molding-sand deposits. The new concern planned the immediate erection of a complete unit for the production of foundry sand with a total capacity of 1,000 tons per day, reserving the gravel deposits for future development.

* * *

Production of concrete products as a side-line for aggregates producers was urged in an editorial.

* * *

Ten Years Ago

THE Anna Stone Co. was incorporated at Anna, Ill., being authorized to issue 7,500 shares of capital stock. Incorporators were Robert E. Rickson, Michael J. McGowan, Charles L. Browne, William Ganschow and George S. Rippetoe.

* * *

Construction was started on a $100,000 plant near Parkersburg, W. Va., by the Kanawha Sand Co. Additional operations at Huntington, W. Va., were planned. C. D. Dotson and C. H. Wright were general manager and chief engineer, respectively.

* * *

The Talc & Soapstone Assn. chose the following officers to serve during 1922: Freeland Jewett, Eastern Talc Co., president; W. E. Seybel, Uniform Fibrous Talc Co., vice-president; Raymond B. Ladoo, U. S. Bureau of Mines, secretary-treasurer.

* * *

Fire partially destroyed the New Milford, Conn., plant of the New England Lime Co., located on the Housatonic River, causing damage estimated at $125,000.

* * *

Plans were in progress for the erection, at Bay City, Mich., of a new three-kiln cement plant by the Aetna Portland Cement Co. The operation was scheduled to have a capacity of 3,000 bbl. per day. Franklin R. Johnson, president, announced that Edmund M. Bruce, superintendent of the company's Fenton, Mich., plant would have charge of the new mill upon completion.

* * *

Five Years Ago

G. K. SMITH of the Albany Gravel Co. was named president of the Empire State Sand & Gravel Assn. at its annual convention held at the Statler Hotel at Buffalo. Other officers chosen were David Hyman, Buffalo Gravel Co., vice-president and John G. Carpenter, Madison Sand & Gravel Corp., secretary-treasurer.

* * *

Two cement plants finished the year 1926 without a lost-time accident, equalling the previous record, according to H. G. Jacobsen, manager, accident-prevention bureau, Portland Cement Assn. The two winners were the Mitchell, Ind., mill of the Lehigh Portland Cement Co. and the Winnipeg plant of the Canada Cement Co., Ltd.

* * *

Excess water in the dolomite quarry of the Keasbey & Mattison Co. at Ambler, Pa., was not only eliminated but made a source of profit when the company installed a pumping station sending the water into the city mains for domestic use and fire protection. The city's former source of supply was found to be insufficient to care for the growing demands of the community.

Completes 25 Years of Service to Industries

The Deister Concentrator Co. has issued the following statement:

"The Deister Concentrator Co., incorporated 1906, is the original mining-equipment company operating in Fort Wayne, Ind., under that or similar style. Throughout twenty-five years of uninterrupted manufacturing and service specialized to separating equipment, the Deister Concentrator Co. has produced and marketed under exclusive rights, patents or patents pending: Deister concentrating tables; Deister - Overstrom ore-concentrating and coal-washing tables; Deister and Overstrom self-oiling table headmotions; Leahy No - Blind vibrating screens; Concenco foundry screens; Concenco plat pickers. It also has produced and continues to manufacture and sell classifiers and other equipment under the Concenco Products trade-mark.

"The Deister Concentrator Co. has at no time relinquished or sold its patents or rights to the above equipment; and, since its inception under the original Deister patents, has produced or acquired all other patents covering extensive improvements to its equipment and for new equipment which the company owns or controls exclusively."

Babcock & Wilcox and Fuller Lehigh Merged

The Babcock & Wilcox Co., New York, N. Y., announces a further consolidation of the resources and facilities of the Babcock & Wilcox and the Fuller Lehigh organizations, effective January 1. The sales offices of the two companies have been combined and all business heretofore carried on separately or jointly by these companies, will be done in the name of The Babcock & Wilcox Co. through its district sales offices.

New Corporations

A. & W. LIME PRODUCTS CO., Big Springs, Tex. O. R. Walker and others.

HI-WAY LIME CO., INC., Pocatello, Ida. $25,000. 250 sh. @ $100. E. J. Dolbeer, W. S. Williams, Thatcher Kimball. Plant to be located at Dolbeer Spur, near Pebble, Bannock County.

WASHINGTON ASPHALT CO., Seattle, Wash. $10,000. R. M. Gillmore, E. F. Requa.

PULASKI MINING CORP., Little Rock, Ark. Edgar F. Dixon, 615 E. 21st St., and others. To operate Bauxite mine near Sweet Home, Ark.

MAGNESITE PRODUCTS CO., Spokane, Wash. $5,000. D. W. Powell, Hugh B. Tinling, R. M. Allgeier.

Personal Mention

Lewis Lloyd has been appointed sales manager of Lone Star Cement Co., Alabama, according to an announcement by **J. W. Johnston**, vice-president and general manager of the company, a subsidiary of International Cement Corp. Mr. Lloyd will make his headquarters at the Lone Star offices in Birmingham.

Orville Amburgey, employed in the Haze gravel pit near Pinckney, Mich., suffered a fractured leg recently when he was caught between two loaded trucks at the pit.

Henry R. Albion has been appointed assistant manager, eastern offices, of the Portland Cement Assn., with headquarters in Atlanta. Mr. Albion, who has been well known for several years in connection with roads and other public improvement work in the southeastern states, entered the field promotion work of the association in Florida in March, 1926, and was appointed district engineer in charge of association activities in that state in 1927. In his new capacity, Mr. Albion will serve as assistant to **J. R. Fairman**, manager of the eastern offices of the Portland Cement Assn., concentrating his attention on association work in the southeastern states.

Henry H. Peck, formerly with the Standard Steel Works Co. of Burnham, Pa., has joined Lukenweld, Inc., Coatesville, Pa., as manager of sales. Lukenweld, Inc., is a division of Lukens Steel Co. and is engaged in the manufacture of arc welded rolled steel parts for all types of machinery and equipment. Mr. Peck succeeds **John S. Bleecker**, formerly in charge of sales for Lukenweld, Inc. Mr. Bleecker has been appointed manager of sales research and advertising for Lukens Steel Co. and its divisions, Lukenweld, Inc., and By-Products Steel Corp.

Henry H. Timken, Jr., has been made assistant to the president of The Timken Steel & Tube Co., Canton, O., it was announced by **Fred J. Griffiths**, president of the company. He has been serving in the capacity of assistant works manager of The Timken Roller Bearing Co. for the past two years.

Walter F. Jahncke, New Orleans vice-counsul of Norway, has been decorated by King Haakon VII of Norway and has been awarded a diploma proclaiming Mr. Jahncke a knight of the first class of the Royal Norwegian Order of St. Olav. The honor was bestowed on Mr. Jahncke because of his distinguished service in fostering desirable relationships between Norway and the southern part

Walter F. Jahncke.

of United States. Mr. Jahncke is vice-president of Jahncke Service, Inc., one of New Orleans' leading producers of aggregates and ready-mixed concrete. He has held the vice-consulate for the past 7 years.

Franklin H. Fowler has been elected president of Foote Bros. Gear & Machine Co. to succeed **James F. Griswold**. The resignation of Mr. Griswold was necessitated by the increasing demands of his time to other business interests. Mr. Fowler is a graduate of the Annapolis Naval Academy, class of 1909, and brings to the company, a wide and well-balanced business experience, embracing the various branches of sales, manufacturing, engineering, administration and finance.

Franklin H. Fowler.

For the past two years Mr. Fowler has been president and general manager of the Construction Machinery Co., of Waterloo, Ia.

Chester H. Lang, formerly assistant manager of the publicity department and then comptroller of the budget of the General Electric Co. has been appointed manager of the publicity department to succeed Martin P. Rice, who retired December 31 after more than 37 years of service with the company. Mr. Lang entered the employ of the company in 1919, immediately following his discharge from the army. After three years as a traveling auditor he was made assistant manager of what was then the publication bureau, which later became the publicity department. He continued in this position until January, 1926, when he was appointed to the newly created position of comptroller of the budget of the company.

Obituary

George A. Colgan, Jr., 37, was slain in the offices of the Seaboard Sand & Gravel Co. in New York on December 28. He was formerly sales manager of the company. John Ragonetti, a former associate of Colgan, is being held by New York police accused of the shooting. The Seaboard firm has long been allied with New York political groups and ill feeling over alleged shady deals in the awarding of sand-and-gravel contracts is said to be behind the slaying, according to New York newspapers.

Wade W. Oliver, aged 60, purchasing agent for the Carbon Limestone Co., died at his home in Youngstown, O., recently, following an extended illness.

Michael J. Ash, 73, treasurer of the Western Lime & Cement Co. of Milwaukee, Wis., for many years and a member of the firm for 47 years, died recently at his home in Wauwatosa, Wis. He had been ill three months.

William M. Rex, superintendent of the Ingleside Limestone Co. of Bayard, Neb., was instantly killed last month when he was struck by a moving car in the company's quarry.

E. W. Harrison, of the E. W. Harrison Pipe Co., manufacturer of concrete pipe and other concrete products in Tacoma, Wash., died recently at his home in Tacoma.

Traffic News and Comment

Recent I. C. C. Decisions

Plaster and Plasterboard.—On reconsideration, the Commission has issued a supplemental report in which it has modified the report in 173 I. C. C. 260 to correct the premise upon which it based its decision in 173 I. C. C. 360. I. C. C. Docket No. 22,561, Texas Cement Plaster Co. v. C. of Ga., et al.

Sand and Gravel.—Upon agreement of the parties the original decision of the Commission in 132 I. C. C. 200, has been modified so as to permit the substitution of distance scale rates prescribed in McGrath Sand and Gravel Co. v. A. T. & S. F., 165 I. C. C. 454, and Terry & Lewis Sand and Gravel Co. v. C. B. & Q., 168 I. C. C. 623, on sand and gravel from La-Grange, Mo., to points in southeastern Iowa. New rates made by the use of the scales are to be made effective not later than February 1, I. C. C. Docket No. 17,789, Misscuri Gravel Co. v. C. B. & Q. et al.

Examiners' Reports

Lime.—In various cases which have been reopened the Commission has prescribed rates on lime between points in Trunk Line and Central territories, made on the basis of distance scales. In general the commodity has been divided into two classes; lime, common, hydrated, quick or slacked, under which class comes all of the lime except that falling under the second class: lime, agricultural or fluxing, having no commercial value for chemical or building purposes. Rates on the commodity coming under the second classification are made 80 per cent. of the rates prescribed on the commodity coming under the first classification. While the two classifications are in effect on traffic between points in Trunk Line territory and from this territory to Central territory and between points in Central territory they were denied Ohio shippers on traffic to Trunk Line territory by division 3.

The carriers have said that some Ohioans are misbilling their product as fluxing lime. They claim they are at a disadvantage on eastern shipments of their low grade product as it must move on the same rate as applies to building lime while eastern competitors have the advantage of a rate which is 80 per cent. of the building lime rate. On petition of Ohio shippers the cases were reopened and a hearing was had before Examiner J. J. Williams.

The examiner recommends that instead of the two classifications of the commodity, two minimum weights be established. That the basis rates prescribed in the various cases to apply on the higher grade product apply to all lime with a minimum weight of 30,000 lb., and that rates on all lime with a minimum of 50,000 lb., be 80 per cent. of the basic rates. This method of rate making now applies on lime traffic south of the Ohio River and it is understood is favored by the Ohio shippers who petitioned for reopening the cases. He recommends that rates not in conformity with these recommendations be found not unreasonable in the past, but unreasonable for the future. I. C. C. Dockets, No. 19,957, Northwestern Ohio Lime Manufacturers et al. v. Pennsylvania et al.; No. 16,170, Eastern Lime Manufacturers Bureau et al., v. A. & B. B. et al.; No. 16,170, Sub. 1, Washington Building Lime Co. et al. v. Same; No. 19,951, Ohio Hydrate & Supply Co. v. Pennsylvania et al.; No. 20,234, Acme Glass Co. v. Pennsylvania; No. 20,234, Sub. 1, Berney-Bond Glass Co. v Same; No. 20,246, Washington Building Lime Co. v. Same and a sub-number Same v Same.

New Complaints Filed

Crushed Stone and Marble.—Violations of sections 1, 2 and 3 on crushed stone and marble from Tate, Ga., to New Orleans, La., as compared with rate via another route, are alleged in I. C. C. Docket No. 24,911, The Builders' Assn. of Kansas City, Mo., Inc. v. L. & N.

Sand.—Violation of the first three sections on shipments of sand from Des Moines, Iowa, to Andover and Blythedale, Mo., are alleged, and cease and desist order and reparation sought in I. C. C. Docket No. 24,916, Koss Construction Co., Des Moines, Ia., v. C. B. & Q.

Fourth-Section Relief

Fifteen Per Cent. Case.—Carriers are authorized to establish the increases authorized in Ex Parte 103, the Fifteen Per Cent. Case, without observing the long-and-short-haul provision of the fourth section. This order is to remain in effect during the period during which the applicants are authorized to apply the said increases. F. S. O. No. 10,800.

Rate-Committee Dockets

New England Freight Assn.

Sand.—To meet motor truck competition carriers propose to reduce the rate on commond sand[1], from Connecticut High Test Sand & Gravel Co. and Hamden Sand & Gravel Co. sidings at New Haven to Dextone Co. siding at New Haven, from 51 c. per net ton to $20.00 per car. Docket No. 24,112.

Trunk Line Assn.

Gypsum.—Carriers propose to establish on ground or crushed gypsum, c.l. min. wt. 40,000 lb., from all producing points in Trunk Line territory to destinations in C. F. A. territory as shown in Curlett's Tariff I. C. C. A-306, Group 3 rates as shown on page 431 of above tariff. Group 4 rates now apply. Docket No. 28,121, Sup. 1.

Lime.—Carriers propose to add to Reading Co. Tariff I. C. C. No. 899, applying on lime to points on the Long Island R. R., Exton, Pa., as a point of origin taking same rates as applicable from Mill Lane, Pa. Docket No. 28,331.

Mortar.—Shippers propose that agency tariffs naming rates on lime and limestone from Martinsburg, Engle and Millville, W. Va., be amended so as to provide for the application of building lime rates on dry building mortar from these points, c. l. min. wt. 30,000 lb., the same as applies on lime. Docket No. 28,387.

Sand.—To meet motor-truck competition, shippers propose that the rate on common sand[1], from Northeast, Md., to Elkton, Md., be reduced from 65 c. to 45 c. per net ton. Docket No. 28,339.

Shippers propose the establishment of commodity rates on glass sand[1], to Alloy, W. Va., from Berkeley Springs, Great Capacon and Hancock, W. Va., of $2.60 and from Gore and Triplett, W. Va., of $2.70 per net ton. Docket No. 28,352.

Central Freight Assn.

Agricultural Limestone.—Shippers propose an amendment to Item 1,655 of C. F. A. Tariff 130-T, wherein is published equivalent table of rates on agricultural limestone or agricultural-limestone screenings, from points on the N. Y. C. & St. L. (N. K. P. District) in Ohio to stations in Ohio, by providing that said rates will also apply on traffic originating at McVittys, O. The present rate is sixth class. Docket No. 30,118.

Cement.—A reduction in the rate on cement, c. l. min. wt. 50,000 lb., from Mitchell, Ind., to West Jefferson, O., from 21 c. to 14 c. is proposed by the carriers. Docket No. 30,159.

Shippers propose reductions in the rates on cement, c. l. min. wt. 50,000 lb., from Evansville, Ind., to Armstrong, Martin and Wendel, Ind., from 9 c. to 6½ c.; to Poseyville, Stewartsville and Barrett, Ind., from 10 c. to 7 c.; and to Griffin and Hovey, Ind., from 11 c. to 7½ c. Docket No. 30,193.

Dolomite.—Shippers propose a reduction in the rate on raw dolomite, from Bettsville, Gibsonburg, Maple

Grove and Woodville, O., to Alton, Ill., from 29 c. per 100 lb. (sixth class), to $2.77 per gross ton. Docket No. 30,149.

Commodity rates on raw dolomite in box cars[1], from Bettsville, Gibsonburg, Maple Grove and Woodville, O., are proposed by shippers as follows: to Chicago Heights, Ill., $2.20; to Streator, Ill., $2.40; to Evansville, Ind., $2.40; to Sistersville, W. Va., $2.02; to Mt. Vernon, O., $1.30; to Utica, O., $1.40. Docket No. 30,195.

Sand.—Carriers propose to establish rates on washed or processed silica sand Col. A rates and on crude silica sand Col. B rates as shown below, from Millington, Oregon, Sheridan, Utica and Wedron, Ill. Docket No. 30,171:

To	Col. A	Col. B
Advance, Ind.	$2.04	$1.70
Alexandria, Ind.	2.04	1.70
Anderson, Ind.	2.04	1.70
Bluffton, Ind.	2.16	1.80
Connersville, Ind.	2.40	2.00
Decatur, Ind.	2.16	1.80
Elwood, Ind.	2.04	1.70
Frankfort, Ind.	1.92	1.60
Hartford City, Ind.	2.16	1.80
Indianapolis, Ind.	2.04	1.70
Kokomo, Ind.	1.92	1.60
LaFayette, Ind.	1.80	1.50
Marion, Ind.	2.04	1.70
Montpelier, Ind.	2.16	1.80
Muncie, Ind.	2.16	1.80
New Castle, Ind.	2.28	1.90
Oxford, Ind.	1.68	1.40
Portland, Ind.	2.28	1.90
Red Key, Ind.	2.28	1.90
Rushville, Ind.	2.28	1.90
Tipton, Ind.	2.04	1.70
Veedersburg, Ind.	1.92	1.60

Sand and Gravel.—Carriers propose to reduce the rate on sand and gravel from Attica, Ind., to Foresman, Ind., from 95 c. to 80 c. per net ton. Docket No. 30,157.

Stone Dust.—Shippers propose a reduction in the rate on stone dust[1], from Carey and McVittys, O., to Muncie, Ind., from $1.76 to $1.70 per net ton. Docket No. 30,154.

Illinois Freight Assn.

Cement.—The following changes in the rates on cement, c. l. min. wt. marked capacity of car but not less than 80,000 lb., to Chicago, have been proposed: Present: From La Salle, Oglesby and Dixon, Ill., 8 c. and from Utica, 7 c. per 100 lb., on Illinois intrastate traffic and 9½ c. on interstate traffic. From Linwood, Ia., 10½ c. per 100 lb. Proposed: From La Salle, Oglesby, Utica and Dixon, Ill., 6½ c. per 100 lb., on Illinois intrastate traffic to be published as a terminal rate and not applied at intermediate points. On interstate traffic from La Salle, Oglesby, Utica and Dixon, Ill., and Linwood, Ia., 9 c. per 100 lb., for deliveries in the Chicago Switching District in Illinois. Docket No. 6,426.

Limestone.—It is proposed to establish a commodity rate of $1.90 a net ton on limestone (broken, crushed or ground) c. l. min. wt. marked capacity of car but not less than 40,000 lb., from Mosher and Ste. Genevieve, Mo., to Ottawa, Ill. Docket No. 6,403.

Western Trunk Line Committee

Cement.—Shippers at Speed, Ind., propose establishment of rates on cement, c. l. min. wt. 50,000 lb., to points in Missouri south of the Missouri River, on basis of same mileage scales and formula as apply from Linwood, Ia., as prescribed by the Commission in Docket No. 21,492. The present rates are combination rates or mileage rates shown in Item 110 of S. W. L. Tariff No. 71. Docket No. 7,517-A.

Reductions in the rate with higher minimum weights have been proposed by cement shippers at Superior, Neb., on shipments to Omaha, Neb., from 12½ c. to 10½ c. per 100 lb., in Sup. 1 to Docket 6,549-D, and by shippers at Des Moines, Ia., on shipments to Omaha, Neb., from 12 c. to 10 c. per 100 lb., in Sup. 2 to the same docket. In both cases the min. wt. is to be increased from 50,000 lb., to 80,000 lb.

Plaster.—Shippers have asked for a reduction in the rate on Keene's cement and wall plaster, c. l. min. wt. 60,000 lb., from Medicine Lodge, Kans., to Cincinnati, O., from 30½ c. to 30 c. Docket No. 5,547-G.

Southern Freight Assn.

Cement.—At the request of shippers for reduced rates on cement from Graystone, Ala., to South Atlantic and Gulf ports, on traffic destined to the Pacific Coast via the Panama Canal, carriers have suggested the rates shown below to apply on a c. l. min. wt. of 50,000 lb. The present rates are the domestic rates. Docket No. 56,474:

To	Present	Proposed
New Orleans, La.	19	13
Gulfport, Miss.	18	13
Mobile, Ala.	16½	12½
Pensacola, Fla.	16½	12½
Jacksonville, Fla.	21	14½
Brunswick, Ga.	20	14½
Savannah, Ga.	20	14½
Charleston, S. C.	21	14½

A basing rate of 43 c. on cement from Graystone, Ala., to Boston, Mass., applicable only to points in Canada basing on Boston, is proposed by carriers, on application of shippers for a reduction. Docket No. 56,475.

Talc.—Carriers propose to publish the following rates on ground talc, c. l. min. wt. 30,000 lb., from points taking the following rate basis as named in Agent Curlett's I. C. C. A-280. Rates in cents per 100 lb. Docket No. 56,535:

	Rate Bases				
To	1	2	3	4	5
Rock Hill, S. C.	50½	50½	47½	40	54½

Southwestern Freight Bureau

Lime.—Shippers at Limedale Spur and Ruddells, Ark., are asking for the establishment of a rate of 30 c. per 100 lb., c. l. min. wt. 40,000 lb., to alternate with the present rate of 36 c. c. l. min. wt. 30,000 lb., on common, hydrated, quick or slacked lime to Denver, Colorado Springs, Pueblo, Trinidad, Colo., and points taking same rates as shown on pages 24 to 27 of W. T. L. Tariff No. 111-G, as amended, in Groups A, B, C and D (except Colorado points in Groups A, B and C) now provided with this application in Item 8,540 of the tariff. Docket No. 24,013.

[1] The carload minimum weight will be 90 per cent. of the marked capacity of the car, except when car is loaded to full cubical or visible capacity, actual weight will apply.

Car-Loading Forecast

While car-loading reports can no longer be considered as a true barometer of business conditions, the various regional-advisory-board forecasts have for several years, and probably will for several more, predicts with a great deal of accuracy the trend of general business conditions. It is probable that the forecast for the first quarter is more nearly accurate on account of the curtailed use of motor trucks during that period. The accompanying table gives the percentage of increase or decrease in car loadings that is expected during the first quarter of 1932 as compared with the corresponding three months of 1931. Figures are available for only those commodities which are shipped in a comparatively large volume. The total actual loadings of all commodities for the first quarter of 1931 was 5,612,161 cars, and the estimate of the first three months of 1932 is 5,241,746 or an estimated decrease of 6.6 per cent. Taking into consideration the loading of all commodities, the Southwest Board covering Texas and parts of each surrounding state has the brightest outlook with an estimated increase of .4 per cent., while the greatest decrease is expected in the Northwest territory covering Minnesota, the Dakotas and Wyoming, amounting to 18.1 per cent.

CAR-LOADING FORECAST FOR FIRST QUARTER, 1932

Board Reporting	Crushed Stone, Sand and Gravel Decrease (*per cent*)	Cement Decrease (*per cent*)	Lime and Plaster Decrease (*per cent*)
New England	No change	No change	20.0
Atlantic States	25.5	10.0	21.5
Allegheny	34.0	11.1	3.4
Great Lakes	26.7	7.8	10.3
Ohio Valley	6.0*	7.5	No change
Mid-West	5.0	32.9	20.0
Northwest	No change	25.0	30.0
Trans-Mo.-Kans.	5.0*	22.9	15.0
Southeast	20.0	5.0	No change
Southwest	No change	10.0	10.0
Central Western	23.9	1.7	19.4
Pacific Coast	1.6*	25.0	No change
Pacific Northwest	9.8	25.6	9.5
Total All Boards	11.7	14.3	13.1

*Increase.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Freeport-Texas Profits to Equal $3.25 a Share

Freeport Texas Co. will show a final net profit for 1931 of approximately $3.25 a share on its 729,844 shares of capital stock, or slightly more than current requirements for the $3 dividend. This will compare with a net profit of $3,124,185 or $4.28 a share earned in 1930. In the first half of this year net was $1,185,092 or $1.62 a share against $1,678,561 or $2.30 a year in the corresponding 1930 period.

Sulphur is an industrial necessity and with sales already off about 40 per cent. from the peak, a further drastic decline in volume seems unlikely in practically all fields except the fertilizer trade. A decline in the use of sulphur by fertilizer companies is probable next year but Freeport Texas has no contracts with this group of consumers and therefore should not be affected.

Freeport's export business in 1931 showed a drop of about 50 per cent. from the 1929 level, and foreign business is now at a level from which a further decline is not likely. The company is not affected by foreign currency fluctuations or credits since all business is done against cash in New York.

During the year Freeport has been building up inventories of sulphur above ground, which stood at $6,073,560 as of June 30 against $5,251,467 on December 31, 1930. From now on, sales will be made in larger proportion from inventories while production will be diminished. This will improve cash position. Cash on June 30 was $2,087,829 against $3,431,763 on December 31, 1930. At the close of 1931, cash on hand was about $2,000,000 after expenditures of about $1,000,000 for the new manganese development in Cuba.

Net quick assets of the company are at present equal to approximately $14 a share for the 729,844 shares of capital stock outstanding.

Freeport plans to diversify its business to some extent by the production of manganese, from its Cuban properties, by means of a new flotation process which it claims is lower in cost than any method now in use. Manganese has a large use in the steel industry and, since it believes Cuban manganese can be landed in this country considerably cheaper than the Russian product, it expects eventually to have substantial income from this new source.

Superior Portland Has Healthy Balance Sheet

Stockholders of Superior Portland Cement, Inc., met January 11 in Seattle for their annual meeting. The year 1931 was the twenty-third of the company's operations, and the sixteenth year of continuous dividend payments. During 1931 the company leased the Seattle cement plant of the Pacific Coast Cement Co., together with its Alaskan quarries, and the figures submitted by President E. P. Lucas to the stockholders included the results of the first six months' operation of these properties.

The stockholders elected the following members of the Board of Directors to function during 1932: R. V. Ankeny; M. A. Arnold; Geo. E. Dickinson; Mrs. John C. Eden; Herman Goetz; James H. Kane; Edwin P. Lucas; John J. Murphy; Chester N. Reitze; J. A. Swalwell; Gordon Tongue; C. L. Wagner.

The Board of Directors chose the following officers:

E. P. Lucas, president.

C. N. Reitze, vice-president and general manager.

G. E. Dickinson, vice-president and secretary.

C. L. Wagner, vice-president in charge of operations.

Gordon Tongue, treasurer and sales manager.

During 1931, $3.30 per share was paid to owners of the Company's Class "A" preferred Stock, and 50c per share to the holders of its Class "B" common. Balance sheet of the company follows:

Assets

Cash	$ 118,268
Investments	337,722
Accounts and Notes Receivable	126,253
Inventories	341,976
Deferred Assets (Work in Process)	295,476
Total Current Assets	$ 1,219,695
Real Estate, Plants, etc.	4,894,187
	$6,113,882

Liabilities

Accounts and Notes Payable	$ 79,294
Pay Rolls	6,622
Reserve for Taxes	36,159
Other Reserves	61,256
Total Current Liabilities	$ 183,331
Capital and Surplus	5,930,551
	$6,113,882

President Lucas pointed out to the stockholders that, during 1931, Superior Portland Cement had been used on many of the outstanding contracts in this section. He enumerated among others the City of Seattle Skagit Power Project; Puget Sound Power & Light Co., Rock Island Dam; U. S. Reclamation Service Kittitas Project; U. S. Navy at Bremerton; Ford Motor Co., Seattle; and the many paving projects in Washington on which this cement was used.

Since leasing the Diamond Plant, that brand has been supplied on the West Seattle Reservoir and the new Federal Building in Seattle.

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable	Company	Class of Stock	Dividend Rate	Holders of Record	Payable
Alpha Portland Cement	Preferred	$1.75 qr.	Dec. 1	Dec. 15	Monolith Portland Cement	Common	$0.40 S.A.	.....	Jan. 2
Alpha Portland Cement	Common	$0.25 qr.	Jan. 2	Jan. 25	National Gypsum Co	Preferred	$1.75 qr.	Dec. 15	Jan. 2
American Aggregates	Preferred	$1.75 qr.	Dec. 21	Jan. 1	New York Trap Rock	Preferred	$1.75 qr.	Dec. 21	Jan. 2
Arundel Corp	Common	$0.75 qr.	Dec. 21	Jan. 2	Owens-Illinois Glass	Common	$1.50 qr.	Jan. 30	Feb. 15
Boston Sand & Gravel	Preferred	$0.87½ qr.	Dec. 22	Jan. 2	Owens-Illinois Glass	Preferred	$1.75 qr.	Mar. 16	Apr. 1
Boston Sand & Gravel	Common	$0.15 qr.	Dec. 22	Jan. 2	Pacific Portland Cement	Preferred	$1.62½ qr.	Dec. 31	Jan. 5
Calaveras Cement	Preferred	$1.75 qr.	Dec. 31	Jan. 15	Pennsylvania Glass Sand	Preferred	$1.75 qr.	Dec. 16	Jan. 1
Canada Cement Co	Preferred	$1.62¼ qr.	Nov. 30	Dec. 31	Pittsburgh Plate Glass	Common	$0.25 qr.	Dec. 10	Dec. 31
Dolese & Shepard	Common	$1.00 qr.	Dec. 21	Jan. 2	Raybestos-Manhattan	Common	$0.40 qr.	Nov. 30	Dec. 15
Giant Portland Cement	Preferred	$1.75 S.A.	.....	Dec. 15	Riverside Portland Cement	Preferred	$1.50 qr.	Jan. 15	Feb. 1
Ideal Cement	Common	$0.50 qr.	Dec. 15	Jan. 2	Santa Cruz Portland Cement	Common	$2.00	Dec. 21	Dec. 24
International Amiesite	Preferred	$1.75 qr.	Nov. 20	Jan. 1	Southwestern Portland Cement	Preferred	$2.50 qr.	.....	Jan. 1
International Cement	Common	$0.75 qr.	Dec. 15	Dec. 31	Southwestern Portland Cement	Common	$1.50 qr.	.....	Jan. 1
International Salt	Common	$0.75 qr.	Dec. 15	Jan. 2	Superior Portland Cement	Class A	$0.27½M	Jan. 23	Feb. 1
Johns-Manville	Common	$0.25 qr.	Dec. 26	Jan. 16	Superior Portland Cement	Class B	$0.25 Sp.	Dec. 12	Dec. 21
Kelley Island Lime & Transport	Common	$0.25 qr.	Dec. 24	Jan. 1	Texas Gulf Sulphur	Common	$0.75 qr.	Dec. 1	Dec. 15
Kentucky Rock Asphalt	Common	$1.75 qr.	Dec. 10	Jan. 2	United States Gypsum	Common	$0.40 qr.	Dec. 15	Dec. 31
Lehigh Portland Cement	Preferred	$1.75 qr.	Dec 14	Jan. 2	United States Gypsum	Preferred	$1.75 qr.	Dec. 15	Dec. 31
Leslie-California Salt	Preferred	$0.20 qr.	Dec. 1	Dec. 15	Warner Co	1st Pfd.	$1.75 qr.	Dec. 15	Jan. 1
Medusa Portland Cement	Common	$1.50 qr.	Dec. 25	Jan. 1	Warner Co	2nd Pfd.	$1.75 qr.	Dec. 15	Jan. 1
Monolith Portland Cement	Preferred	$0.40 S.A.	.....	Jan. 2	Worcester Salt	Common	$1.25 qr.	Dec. 24	Jan. 2

Review of Foreign Practice

Briquette Preparation for Shaft Cement Kilns

Revival of interest in the shaft kiln, because of the development of up-to-date improved kilns of that type, has brought with it a revival of interest in the preparation of the briquettes for kiln feed. Heretofore machines available for this service were mainly (1) the revolving press, which has a comparatively low capacity in proportion to its first cost and maintenance; (2) the tamping press, which can not be installed close to the kiln because of its vibration; and (3) the mallet press, which tends to choke unless the material has the exact amount of moisture it requires. These disadvantages of existing machines, together with the search for a machine that will prepare briquettes in smaller size so that the kiln can be charged and the firing made more uniform than in the case of the larger bricks, has led to the development of a roll-press which possesses many advantages for the preparation of shaft-kiln raw material. It was developed by the Dorstener Eisengiesserei und Maschinenfabrik, Hervest-Dorsten, Germany, and consists of two large perforated cylinders—one on a fixed mounting and one on a sliding mounting—through which the raw-material and fuel mix is fed. The material is squeezed through the perforations (of 20- to 40-mm. diameter, as required) into the interior of the cylinders, breaking off in lengths varying with the properties of the material. The small cylinders of raw mix are then chuted from the interior of the cylinder to the kiln-feed bin.—T. Klehe in *Tonindustrie-Zeitung* 55:1010 and 1011, Sept. 3, 1931.

French Lime Plant Adds Improved Type of Kilns

The LaGueche (Cher, France) plant of the Societe des Anciens Etablissements Jeanrot Fils is the only operation in the famous Beffes basin which is on the P.-O. railroad, and because of this favorable trade advantage has taken pains to keep its plant always modern. In 1927 one program of modernization included the rebuilding of the grinding, separating and sacking departments. The latest modernization consists of replacing the old battery of 11 oval-section shaft kilns, with which the fuel consumption varied from 230 to 270 kg. of coal per metric ton of burned lime, with two up-to-date kilns, and improved mechanical equipment for hydrating and material-handling.

In the new installation a double automatic elevator lifts cars of stone and fuel to the upper platform above the kilns, where they are pushed over a track system and discharged directly into the kilns. The two kilns are of the cylindrical vertical type, with an inner diameter of 3.5 m. at the top and 3.75 m. at the bottom, and approximately 9 m. high. They have natural draft, and a circular vertical grate makes it possible to regulate the entry of air required for combustion, while facilitating the control of the regular descent of the calcined product. The drawing is entirely mechanical. A simple apparatus, with no mechanism in the interior of the kiln, makes it possible, with a slow reciprocating motion, to bring down the charge uniformly without disturbing violently the upper layers, thus without danger of disturbing the firing level. Regulating the stroke of the movement regulates the drawing capacity. The calcined product falls to a shaker conveyor leading to a jaw crusher.

After being crushed to about 3 cm. (1.2 in.) the lime is lifted to a second conveyor distributing to three reinforced-concrete cylindrical hydrating bins with a total capacity of about 1,200 metric tons. Water for hydrating is added by sprays a few centimeters from the feed to each bin. The lime is reclaimed from these bins by drag-chain conveyors and is then conveyed to the grinding department. The part of the plant described requires only six men for the production of 105 tons of lime daily, one at the raw-material elevator, two at the charging floor, one attending the hydrating sprays, one in charge of drawing and crushing and one supervising the reclaiming from the hydrating bins. The fuel consumption, which used to be from 23 to 27 per cent. of the calcined product, has been reduced to 13 per cent. The fuel is gas-plant coke residue.—A. Rey in *Revue des Materiaux de Construction*, No. 265, pp. 397-401, Oct., 1931.

Comparative Tests With High-Strength Cements

These comparative tests were carried on in concrete with three different mixing proportions, with five "supercements" and one sample of fused alumina cement, with the object of obtaining information on two subjects: (1) whether the high strengths obtained in the earliest days are maintained in the months that follow, and (2) whether the decrease in the strengths, often very pronounced during the first few days, through excess of mixing water, persists to the end or whether on the contrary it lessens with the passage of time to the point of becoming negligible. Comparison of the results of the various cements at two days, seven days, three months, nine months and two years leads to the following observations:

(1) The differences in average strengths observed at two days, seven days, three months, and nine months is still found at two years. Comparing the strengths of concretes with 0.6 water-cement ratio with those of concretes with 0.8 water-cement ratio (the two extremes in the investigations), it is observed that the fall in strength is 51 per cent. at two days, 29 per cent. at seven days, 26 per cent. at three months, 25 per cent. at nine months and 27 per cent. at two years. It is therefore apparent that after seven days the difference in strength is practically constant and remains around 27 per cent.

(2) The increases in strength between nine months and two years seem essentially the same for all types of concrete of whatever initial content of mixing water. Concrete mixed with 0.7 water-cement ratio at two years reaches the nine-months strength of 0.6 concrete, and that mixed with 0.8 water-cement ratio reaches at two years only the three-months strength of the lean mix.

(3) In the case of the samples of fused alumina cement, it was similarly found that the differences in strength accompanying increased mixing-water content in the lower periods were found again at two years. In studying the differences in strength between fused-cement concrete of 0.6 and 0.8 water-cement ratios, it was observed that the average absolute difference of strength was approximately the same as in the "supercements" investigated; in percentages, the difference is 30 per cent. at two days, 28 per cent. at seven days, 25 per cent. at three months, 22 per cent. at nine months and 20 per cent. at two years—thus diminishing with the passage of time and seeming stabilized at about 20 per cent.—Report from the Union Technique du Batiment et des Travaux Publics in *Le Ciment* 36:459-460, Dec., 1931.

Objects to Requirement of Preliminary Testing

The proposed new German standard specifications for cement testing contain one requirement which was not contained in the former specifications: a section calling for preliminary testing of cement by determining the setting time with the finger nail and for the use of the accelerated soundness test by the boiling test. The author examines these tests and their value, and points out that both have faults which make them unsatisfactory as methods of standard specifications, although both have a relative value when used in certain scientific investigations and correctly interpreted.—Dr. G. Haegermann in *Zement* 20:1032-1036, Dec. 3, 1931.

Recent Patents

AMERICAN

Concrete

Concrete-laying machine. Dell G. Clifford, Chicago, Ill. No. 1,837,529.

Liquid tank for concrete-mixing apparatus. James E. Bushnell, North Plainfield, N. J., assignor to Ransome Concrete Machinery Co., Plainfield, N. J. No. 1,837,203.

Bowl-type concrete-mixer. Francis O'Reilly, San Francisco, Cal. No. 1,837,287.

Apparatus for distributing and spreading concrete and like materials. Hugh P. Paris, Oakland, and Albert Knowles, San Francisco, Cal. No. 1,837,580.

Water-valve control for concrete mixers. Samuel Shafer, Jr., Milwaukee, Wis., assignor to Chain Belt Co., same place. No. 1,839,807.

Crushing

Crushing-mill. Ernst C. Loesche, Berlin-Lankwitz, Germany. No. 1,838,998.

Dredging

Cutter for suction dredges. Arthur W. Daniels, Chicago Heights, Ill., assignor to American Manganese Steel Co., Chicago, Ill. No. 1,840,025.

Excavating

Digging tooth. Layton S. Shaffer, Ravenna, O., assignor to Byers Machine Co., same place. No. 1,837,341.

Digging-bucket construction for excavators. Ary C. Clark and Arthur L. Graves, Imperial, Cal.; said Graves assignor to Imperial Irrigation District. No. 1,838,362.

Draft attachment for excavating machines. Harvey S. Knight, Evanston, Ill., assignor to American Manganese Steel Co., Chicago, Ill. No. 1,838,770.

Excavating bucket. William M. Venable, Pittsburgh, Pa., assignor to Blaw-Knox Co., same place. No. 1,839,281.

Steam shovel. Charles W. Wallis, Toronto, Ont., Canada. No. 1,840,002.

Screening

Screen. Loren G. Symons, Hollywood, Cal., assignor to Symons Bros. Development Co., Los Angeles, Cal. No. 1,839,614.

Unclassified

Apparatus for measuring fineness of finely-divided materials. Robert T. Knapp, Pasadena, Cal., assignor to Riverside Cement Co., Los Angeles, Cal. No. 1,838,628.

Dehydrating classifier for sand-and-gravel plants. Otis E. Perkins, Portland, Ore. No. 1,839,804.

FOREIGN

Cement and Concrete

Artificial puzzolan and process of manufacture. R. L. Salmon. French 708,569.

Process of making a concrete resistant to the action of acids. Stellawerk Akt.-Ges. vormals Willisch et Cie. French 709,546.

Process for preparation of Portland cements high in magnesia. E. Boyneburg. French 709,740.

Admixture for quick-setting mortar and process for manufacture. Rohstoff-Veredelungs und Mörtelbau Ges. m. b. h. French 710,302.

Process for production of a hydraulically-hardening material from cement and bitumen-bearing slate. Weber-Kranz & Co. G. m. C. H., Wiesbaden. German 541,535.

Crushing and Grinding

Grinding apparatus. Max Stolley, Paderborn. German 541,516.

Grinding apparatus for granular material. Dipl.-Ing. Klaus Thormaehlen, Dortmund-Derne. German 541,517.

Pulverizers. Erie City Iron Works. British 363,010.

Ball-crushing mills. S. A. Ward. British 363,065.

Machines for crushing coal, coke or other minerals. I. H. Pilot. British 363,269.

Drilling

Rock-drilling operation. Minimax Akt.-Ges., Berlin, assignee of Franz Schurmeyer, Buer-Erle, Westfalia, Germany. Canadian 318,713.

Rotary well-drilling machine. W. W. Triggs (National Supply Co.). British 362,948.

Drying

Sand-drying apparatus. Roston Tuck, Needles, Calif. Canadian 318,618.

Apparatus for drying moist precipitates, especially lithopone. "Sachtleben" Akt.-Ges. für Bergbau und chemische Industrie, Homberg, Lower Rhine. German 541,537.

Excavating

Dredge or excavator operated by cable. Felten & Guilleaume Carlswerk Akt.-Ges. French 708,494.

Power trip. Thew Shovel Co., Lorain, assignee of Thomas F. Stringer, Elyria, Ohio. Canadian 318,744.

Kilns

Process and apparatus for the burning of cement and similar products. Fellner & Ziegler Akt.-Ges. French 709,860.

Material-Handling

Process and apparatus for conveying mortar, concrete and similar materials. A. H. G. Vanson. French 709,858.

Belt-conveyor device. Lucien Krieger, Arceuil, Seine, France Canadian 318,592.

Conveyor for lump, granular or powdered material. Arnold Redler, Sharpness Docks, Gloucester, England. Canadian 318,603.

Scraper conveyor. Albert Ilberg, Mors-Hochstrass. German 541,443.

Elevator, especially bucket elevator. George Haiss Mfg. Co., Bronx, N. Y. German 541,290.

Apparatus for raising, lowering and tipping a car or skip. Zygmund Paszkowski, Yvoz-Ramet, Belgium. German 541,446.

Conveying apparatus. Lübecker Maschinenbau - Gesellschaft, Lübeck. German 541,448.

Cableway tower. Gesellschaft für Förderanlagen Ernst Heckel m. C. H., Saarbrücken. German 541,447.

Conveyors. E. Barker and J. Featonby. British 363,085.

Mixing

Concrete-mixer. Comessa Constructions Mecaníques Schiltigheim-Strasbourg, Soc. Anon. French 706,865.

Concrete-mixer. Usines de Thisselt lez Willebroek, Soc. Anon. French 709,793.

Sacking

Sack-filling machine. Societe d'Exploitation des Procedes Industriels Candlot, Paris, France. German 541,289.

Filling-tube. Arno Andreas, Munster, Westfalia. German 541,440.

Bag-holder. Hans Krapf, Floss, Bavaria. German 541,220.

Screening and Separating

Electrical-precipitation apparatus. International Precipitation Co., Los Angeles, Cal. Canadian 318,694 (assignee of George H. Horne, Glendale, Cal.), 318,696 (assignee of Heinrich Bernhard Ruder, Frankfurt a. M., Germany) and 318,697 (assignee of Evald Anderson, San Marino, Cal.).

Precipitator-cleaning device. International Precipitation Co., Los Angeles, Cal., assignee of Carl W. J. Hedberg, East Bound Brook, and Harry A. Wintermute, Plainfield, N. J. Canadian 318,695.

Apparatus for the pneumatic separation of materials. R. H. Kirkup. British 363,147.

Unclassified

Process for manufacture of artificial marble and product thereof. E. Relevant, G. Sormani and G. Barone. French 708,533.

Process for uniting a mass composed of cork grains to a mass of concrete or cement, and construction units made by this process. E. Tropp. French 709,491.

(Continued on page 65)

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Cars

Atlas Industrial Car Equipment. 28 p. (Bull. No. 1240. The Atlas Car & Manufacturing Co., Cleveland, O.) Describes and illustrates equipment for industrial cars and railways. Includes a complete range of cars for every purpose in industry as well as special equipment, skips, weigh larries and cages.

Chemical Service

The Consulting Chemist and Your Business. (Foster D. Snell, Inc., Brooklyn, N. Y.) Outlines the nature of the services rendered by this company.

Excavators

Marion Type 450 1¼ Cu. Yd. 8 p. (The Marion Steam Shovel Co., Marion, O.) Tells the story in picture of a new convertible excavator of 1¼-cu. yd. capacity. Available in either gasoline-electric or Diesel-electric power.

Explosives

Experiment Station—Hercules Powder Co. 36 p. (Hercules Powder Co., Wilmington, Del.) A deluxe brochure describing the splendid new research and experiment station this company recently completed near Wilmington. The book tells of the new research facilities and explains in a thorough manner the work being done in the explosives field.

Ladders

Safety—With Shur-Foot. 4 p. (Eggers Pole & Supply Co., Chicago, Ill.) Describes and illustrates a useful safety device for use about the quarry or plant in the form of an automatic leveler and locking base for ladders.

Metals

Promal Castings. (Bull. No. 1250. Link-Belt Co., Indianapolis, Ind.) Promal, which is a metal originally developed for Link-Belt's own use in manufacture of conveying and power-transmitting chains, is now available in casting form for the use of the designer and producer of machines, parts, etc., where the inherent characteristics of Promal are an advantage or requisite. This new book illustrates and describes Promal, shows its various applications for other purposes than chain, and gives a comprehensive description of its qualities and technical data concerning it.

Pumps

Morris Heavy-Duty Lined Dredging Pumps. 12 p. (Bull. 143. Morris Machine Works, Baldwinsville, N. Y.) Describes and illustrates Morris heavy-duty lined dredging pumps for special severe services. The renewable lining and other features that are designed to provide economical maintenance are fully described and the bulletin will be found of particular interest to users of centrifugal pumps where the material to be handled is highly abrasive.

Morris Medium-Duty Dredging Pumps. 12 p. (Bull. 142. Morris Machine Works, Baldwinsville, N. Y.) Describes and illustrates the many new features that have been incorporated in the design of Morris medium-duty pumps for sand-and-gravel, dredging, and similar services where water containing abrasive material in suspension is to be pumped. Besides including a complete explanation of these pumps, the bulletin contains views of installations in various types of service, typical performance curves, and tables of direct-connected pumps.

Speed Reducers

Gearmotors. 4 p. (Leaflet 20536. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.) Describes and illustrates "gearmotors," consisting of speed reducers compactly combined with induction motors into general purpose unit drives. Information on application and operation, details of construction, a listing of sizes and speeds, and dimensions are included. Copies are available through any Westinghouse sales office or from the company's advertising department at East Pittsburgh.

V-Belts

Falls V-Belt Drives. 32 p. (The Falls Clutch & Machinery Co., Cuyahoga Falls, O.) Explains outstanding facts about V-belt drives and points out the advantages of those produced by the concern. Contains important data on power ratings, calculations for determining proper drives and other tabular material.

Wagons

Dreadnaught Crawler Wagon. 8 p. (Electric Wheel Co., Crawler-Wheel Division, Quincy, Ill.) Describes and illustrates a dump wagon mounted on crawlers. Features include a rigid drawbar, rear hitch for train operation, light draft, and 27½-in. clearance. Made in grader type of 7½-cu. yd. capacity and in shovel type of 8½-cu. yd. capacity.

Recent Patents

(Continued from page 64)

Process and apparatus for manufacturing and reinforcing articles of concrete and the like. B. Ruml and F. Ruml. French 709,581.

Device for controlling the flow of granular, pulverulent or like material in chutes or slides. William Ross, Surbiton, England. Canadian 318,407.

Cable clamp. Canadian Lime Materials, Ltd., Scarboro Junction, Ont., assignee of Alwin G. Steinmayer, South Milwaukee, Wis. Canadian 318,664.

Process of leaching phosphate rock. Kunstdunger - Patent - Verwertungs Akt.-Ges., Glarus, Switzerland, assignee of Markus Larsson, Berlin, Germany. Canadian 318,701.

Process for converting slag into industrially usable products. Det Norske Aktieselskab for Elektrokemisk Industri, Oslo, Norway. German 541,379.

Process for the production of high-refractory material and bricks from a mixture consisting essentially of fused aluminum oxide and calcined magnesite. Dr. Berthold Redlich, Feldkirchen near Munich. German 541,380.

Froth-flotation concentration of minerals. Minerals Separation, Ltd., and S. Tucker. British 363,122.

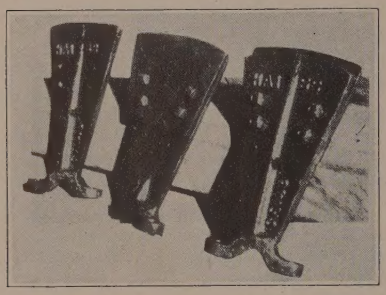
Manufacture of articles from basalt. British Thomson-Houston Co. British 363,291.

Members of the newly-formed Materials Handling Institute which held its organization meeting at Cleveland, O., on Dec. 8.

New Machinery and Supplies

Renewable Tips Take Up Wear on Paddle Blades

While the introduction of manganese steel has gone a long way toward lengthening the life of bucket-loader wearing parts, the service to which the feeding paddles on the Haiss type machine are subjected, causes continuous gradual wear. This slow abrasion at the tip of the paddle eventually



Renewable tips for loader paddles.

causes a shortening of its length to a point where it fails to dig quite as deep as the leading edge of the buckets on the elevator chain.

Rather than subject the machine user to the necessity of renewing the entire heavy manganese casting, the George Haiss Manufacturing Co. is equipping the Haiss excavator and its series of heavy-duty loaders with paddles to which can be bolted renewable tips. This inexpensive repair restores the paddles to full length and can be repeated as often as necessary.

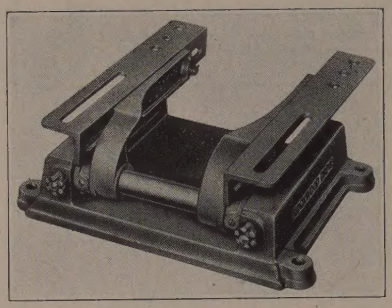
An Adaptable Motor Base for Short-Center Drives

The Rockwood short-center drive has a new base equipped with adjustable arms. The motor is mounted on these adjustable arms, and the drives are now adaptable to all types of motors, old or new, 25, 50, or 60 cycles, single or polyphase, a.-c. or d.-c.

These new bases permit mounting the motor so that any part of the motor rating can apply to the driven machine without waste of current or power. If operating a motor and utilizing only part of the motor rating, one can adjust the weight of the motor to give the tension on the belt and bearings required by the load.

Each drive is completely engineered so that not only can the weight of the motor be placed so as to definitely control belt tension to any desired tension but the actual load required of the driven machine can be measured and provided for immediately after installation.

This permits minimum wear on the pulley and motor bearing, and a belt tension that greatly lengthens the life



The new adjustable motor base for short-center drives.

of the belt. The life of the belt is at least doubled. The power consumption is held at the minimum and is only that required by the driven machine.

Motors installed on machines for a given work that have the work changed can have the motors adjusted so that the new requirement is met by the individual motor installation without changing the motor. All that is done is to move the motor on the adjustable arms to the new position dictated by the requirements of the new work.

The drive has high efficiency and, as it operates with high-grade leather belts and flat paper pulleys, this efficiency does not decrease with use but is maintained for the life of the belt.

The Rockwood drive is positive and yet flexible. It has the full overload capacity of the best leather belting (over 75 per cent.), and each drive is installed with 150-per cent. capacity of the motor rating. It has the leather belts ability to increase in capacity whenever the belt is overloaded. This makes the drive especially competent to handle varying loads and sudden starting and stopping. It is excellent on line start motors, as the pivoted base protects the motor on sudden starts.

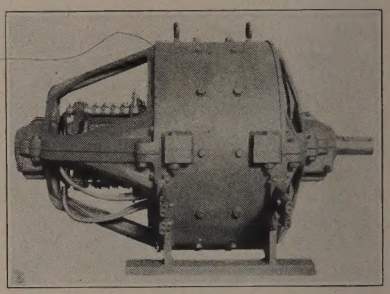
Adds Larger Motors to Direct-Current Series

Larger motors for its Type T direct-current line have been announced by the Reliance Electric & Engineering Co., Cleveland, O. The new motors range in size from 100 hp. at 800 r.p.m. to 350 hp. at 1,200 r.p.m.

An unusual procedure was followed in their design. Thirty-four engineers responsible for the care and operation of motors in some of the country's largest plants were shown the tentative plan. They made recommendations for improvement based upon their years of practical experience with all types and makes of motors. Their ideas were incorporated to make these new motors superior power units.

A rolled-steel split-frame construction is used. The feet and supporting members are of heavy bar steel securely welded to the frame. There are six main poles and six commutating poles. For the field coils metal bobbins are used.

Brackets and sleeve bearings are of split design. Two oil rings at the front end of motor and three at the back keep the bearings well lubricated.



One of the large direct-current motors.

The brushholders combine the advantages of the reaction-type with those of the box-type. The brushes are always kept at proper tension. Brush studs are made of steel, cadmium plated. Heavy fibre insulation is used for the studs.

Hard-drawn copper bars are used for the commutator. The construction of the commutator is such that the bars will not loosen upon expansion or contraction.

The leads are brought through both ends of the frame and held in place by wooden cleats. No terminal board is used so that the connections can be completely taped and need not be exposed.

The motors may be supplied for constant-speed or adjustable-speed service with a range of 2 to 1 or 3 to 1.

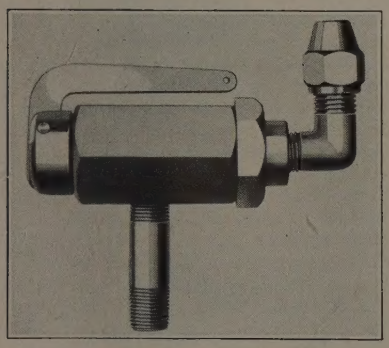
Acetylene Primer Helps Start Gasoline Engines

The P-O-L primer, a unique device for facilitating the starting of gasoline engines, either automobile or stationary, has just been introduced by The Linde Air Products Company, New York, N. Y. The primer is a simple and easily-installed device for introducing acetylene, a highly-combustible gas, into the cylinders of an internal combustion engine so that it will start easily and quickly. It provides a positive, safe, and economical method of starting gasoline engines.

The primer consists, essentially, of a special stem-type brass primer valve, a Prest-O-Lite pressure regulator and 10 ft. of ¼-in. brass tubing with compression unions. The assembly is used in conjunction with the ordinary Prest-O-Lite tanks that are

so extensively used for headlighting systems on trucks and tractors, and for operating a wide variety of heating, soldering and brazing torches.

The P-O-L primer valve is mounted on the intake manifold of the engine, the regulator attached to the tank valve and the two connected with ¼-in. brass tubing. The regulator automatically reduces the tank pressure of the acetylene to a low line pressure and the primer valve controls its flow into the manifold. The valve is operated by a pull wire which leads from the valve lever through the dash if the vehicle has a self-starter, or



Primer for gasoline engines.

through the radiator if hand cranking is employed. On a stationary engine the pull wire may lead to any point that is convenient when cranking. If the truck or tractor is already equipped with a Prest-O-Lite tank, both primer and lighting system may be operated simultaneously from the same tank by the use of a simple adaptor.

In starting an engine the usual procedure of spark and gas adjustment is followed except that the P-O-L primer is used instead of the full choke. Intead of raw gasoline, the primer introduces into the cylinder combustible acetylene which fires easily and quickly and the engine turns over at once. After a few revolutions, it will pick up on the regular carburetor mixture.

This new device not only minimizes the strain on the starting system, and eliminates the necessity of excessive hand cranking, but also reduces the possibility of introducing raw gasoline into the cylinders with the attendant evils of excessive wear and crank case dilution through excessive use of the carburetor choke. It is particularly useful in cold weather when gasoline engines are usually hard to start.

Besides being adaptable to gasoline engines on automobile trucks and tractors, it may also be used on motor boats, stationary engines and engines operating pumps, air compressors, or other equipment.

New Wire-Screen Cloth Is Abrasion-Resistive

The very latest development in the manufacture of alloyed-steel screening, where unusual abrasion is to be resisted, is known as Jersey "Abraso" EE Spring Steel, which is especially adapted for use on vibrating, rotary, shaking and gravity screens.

This abrasive-resisting alloyed steel is made under a special process by John A. Roebling's Sons Co., Trenton, N. J., and is being supplied in practically all specifications from 6¼ in. openings down to 18 meshes per linear inch.

Concrete Bucket Rights Acquired by Blaw-Knox

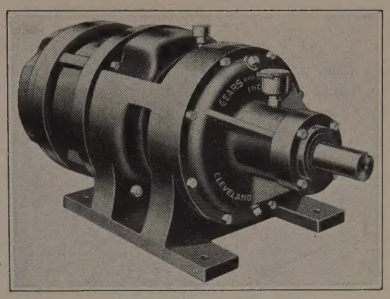
The Blaw-Knox Company has acquired exclusive manufacturing and sales rights of the Wiley concrete bucket, formerly manufactured and sold by The Dayton Whirley Co., Dayton. O. It will henceforth be known as the Blaw-Knox concrete bucket.

These buckets are for derrick or cableway operation, but can also be used as floor hoppers for loading buggies, wheelbarrows, or discharging into chutes. The buckets utilize a single radial gate for opening and closing. This gate is extremely easy to operate regardless of the amount of concrete in the bucket, giving absolute control of the discharge of the aggregate at all times. The bucket is extremely easy to spot just where concrete is required, is water-tight and permits full delivery of batch of grout to forms without loss of aggregate. Buckets are made in the hook-on and two line types.

Blaw-Knox concrete buckets are made in three standard sizes —18, 33 and 63 cu. ft. capacity, respectively. Larger buckets can be made to order, as required. Literature describing this bucket will be sent upon application to Blaw-Knox Company, Pittsburgh, Pa.

Motor Built Integrally With Planetary Reducer

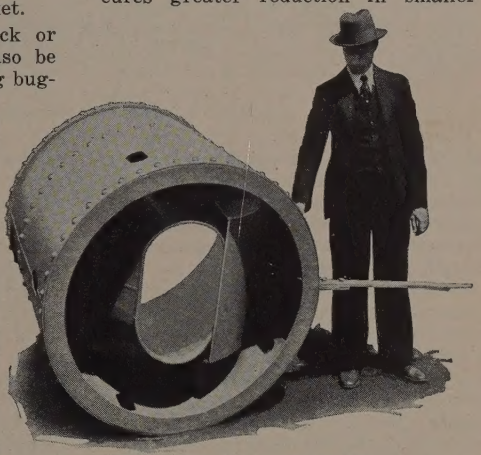
A speed reducer of the planetary type built integral with an electric motor, forming a single, neat and compact unit known as a motorized speed reducer, has recently been placed on



Planetary-type motorized speed reducer.

the market by Gears & Forgings, Inc., Cleveland, O.

This self-powered and self-contained type of speed reducer is designed particularly for applications where available space for the driving mechanism is limited. Due to the simplicity of planetary design this type of unit secures greater reduction in smaller



View showing the concrete bucket.

space than any other system of gearing.

The housing of the reduction gears is dust-proof and oil-tight. It is integral with base which extends to center line of motor and also provides rigid support to gearing and output shaft which carries the load. No additional loads are imposed on motor shaft which is supported by two ball bearings.

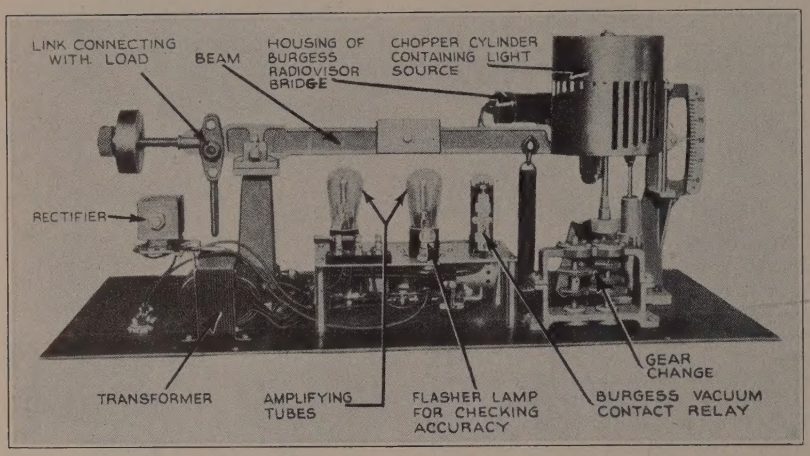
The G & F planetary type of motorized speed reducers is built in thirty-four standard ratios ranging from 4:1 to 240:1 inclusive, and in sizes ranging from ¼ hp. to 30 hp.

Scale Employs Light Beam to Weigh Moving Material on Belt

ACCURATELY weighing the steady flow of material passing by on a conveyor belt; keeping careful count of the tons that have been handled; and finally, recording on a time chart the belt loadings throughout the 24 hours of the day—such is the latest job undertaken by electric eye and ingenious electric brain. This application of the light-sensitive cell and electrical integrator or counter, to use plain terms, represents a notable advance over the means heretofore employed in accomplishing this task, mainly by way of simplicity, lower cost and more positive adjustment. While the general scheme of weighing a continuous flow of material remains the same, the means whereby passing weights are converted into corresponding electrical impulses for the operation of the integrator, has been radi-

cally changed with the introduction of the light-sensitive cell.

To obtain the weight of a continuous flow of material, it is necessary to combine the size of the stream with the speed at which it moves. The speed may be constant, but the size of the stream may range from nothing to the full capacity of the conveyor. Consequently, any variation of load must be instantaneously noted at the controller so that true integration of weight may be obtained.



How the "electric-eye" scale is constructed.

At the point where the continuous stream of material is to be weighed, a short section of belt is installed, mounted in such manner that its varying weight is communicated to the weight checking equipment placed directly above. With the varying weight of the load on the conveyor belt, the beam of the weight checking mechanism is actuated. The scale load at one end causes the fulcrumed beam to swing over the scale of the load indicator at the far or free end. This of course indicates the instantaneous weight, but there is still need for some device to keep tally of the continuous procession of varying weights. It is at this point that the electric eye gets to work.

Close to the free end of the swinging beam is mounted a cross arm carrying a Burgess radiovisor bridge or simplified form of light-sensitive cell, and a light-source lamp. These members are so mounted that one is outside while the other is inside a revolving light-chopper cylinder which is driven in step with the speed of the belt. The light-chopper cylinder derives its name from the fact that it carries 32 parallel longitudinal slots which serve to interrupt the passage of the beam of light between light source and bridge. However, the slots are of varying lengths. The first is equal in length to the distance traveled by the scale beam from zero to full load. Each succeeding slot is shortened an equal amount at the bottom, so that a line drawn from the bottom of slot 1 around the cylinder to the bottom of slot 32 would form a true helix, touching the bottoms of all slots.

The bridge or cell is mounted in a housing provided with a window directly opposite the sensitive plate. The condensing lens of the light source is adjusted to concentrate an intense beam of light through the window and on to the light-sensitive plate. However, the wall of the rotating chopper cylinder comes between, allowing the light beam to pass only when a slot is in line. Each admission of light reaching the bridge sets up an electrical impulse, which impulse in turn drives the mechanism of the integrator or electric brain that keeps tally, as well as the time chart recorder.

With no load on the belt the free end of the beam is down, with the focused point of light just below the bottom of slot 1 of the chopper cylinder. Hence no impulses result since no light reaches the bridge. However, as load is placed on the belt the beam swings upward proportionately, bringing the focused point of light higher and higher on the chopper cylinder, so that more and more slots admit light and cause a corresponding number of impulses to actuate the electrical integrator. The number of impulses are always proportional to the load, from zero to the capacity at which the scale is calibrated. At full load there are 32 contacts per revolution of the chopper cylinder. With 350 contacts per minute and a belt speed of 350 ft. per min., an impulse is obtained for each foot of belt, which is representative of a certain amount of material passing over the scale.

The bridge, light source and chopper cylinder serve to produce the necessary electrical impulses which are amplified by means of a two-stage amplifier designed and built by the engineering staff of the Burgess Battery Co. The amplifier output operates a Burgess vacuum-contact relay capable of handling all the current required for the operation of one or more integrators or counters, which may be located at any distance from the scale.

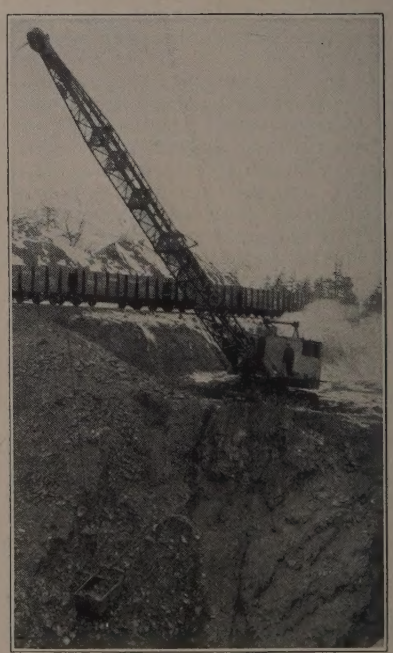
The Telepoise, as the ingenious continuous weighing and recording mechanism is termed by its designer, E. J. White of the staff of John Chatillon & Sons, pioneer builders of scales, is finding many applications where bulky materials must be weighed while in motion.

Aluminum Boom Installed Year Ago Proves Worthy

During January, 1931, a dragline with a 75-ft. aluminum-alloy boom and 1½-cu. yd. bucket was put into operation at an anthracite stripping operation of the Dick Construction Co. This aluminum alloy boom is the first of this metal to be manufactured by an excavating machinery company and placed in regular service. During these many months of constant and vigorous use the boom has proved entirely satisfactory in all respects.

Its unusual feature is, of course, its light weight which is only two-thirds that of a steel boom. Perhaps, the most striking way of illustrating the difference between this type of boom and the ordinary steel boom is to make the statement that a steel boom has one-half again as much weight and more than 50 per cent. additional inertia. This makes possible securing a longer reach with standard bucket sizes or using standard boom lengths with an increase in bucket size.

The boom was built by Bucyrus-Erie Co., who have applied this type of boom to several other installations up to 175 ft. in length, upon all of which it has most definitely proved its advantages. The manufacturer now offers to the industry aluminum-alloy booms for any size drag-line.



The aluminum-boom excavator in operation.